CAMBRIDGE SYSTEMATICS

New Jersey 2003 Statewide Freight Data Profile

final

report

prepared for

New Jersey Department of Transportation

prepared by

Cambridge Systematics, Inc.

September 26, 2005

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1.0 Introduction

1.1 Purpose and Need

An important step in evaluating the impact of freight movements on New Jersey's transportation system is to develop an understanding of the commodity flow patterns affecting the state. To inform the New Jersey Statewide Freight Plan and establish data benchmarks, the New Jersey Department of Transportation (NJDOT) directed Cambridge Systematics, Inc. (CS) to prepare this New Jersey Statewide Freight Data Profile.

1.2 Data Sources and Limitations

The primary data source for this Freight Data Profile is the TRANSEARCH commodity flow database purchased by NJDOT. TRANSEARCH is a commercial data product developed by Reebie Associates (now a part of Global Insight, Inc.). TRANSEARCH provides estimates of county-to-county and state-to-state freight flows by truck, rail, air, and water. TRANSEARCH also provides separate estimates for different commodity types. TRANSEARCH utilizes proprietary data to estimate truck flows, Federal Railroad Administration Waybill Sample data for rail flows, and other public sources for air and water flows.

The TRANSEARCH data captures domestic commodity tonnage moving within the United States. It does not capture "non-freight" vehicle movements (empty trucks or railcars, service vehicles, etc.). Nor does it capture international movements. However, the effect of cross-border truck and rail moves are in the data, as domestic moves from the point where they entered the U.S.. Similarly, the "domestic leg" of international air cargo and waterborne cargo – the moves to and from airports and seaports – are covered in the data. All "linked" trips – such as cargo that moves by rail to a New Jersey terminal, then by truck to a local destination – are reported as separate and distinct trips.

The TRANSEARCH-processed waybill data was not available for this analysis, so CS directly processed and analyzed waybill data provided to NJDOT under separate authorization by the Surface Transportation Board. Also, because TRANSEARCH does not include international waterborne and international air traffic, CS utilized supplemental waterborne data from the U.S. Army Corps of Engineers (ACOE) and air cargo data from the Port Authority of New York and New Jersey (PANYNJ), which does include both domestic and international tonnage. Aggregated data covering all of New Jersey's marine terminals was available, but data for New Jersey's cargo airports was available only for Newark, and not with directional specificity.

1.3 Analytical Approach

A quantitative commodity flow analysis provides the means to better understand freight movements into, out of, within, and through the state by identifying the volumes and types of commodities moving in the state, the modes on which those commodities are traveling, and the origins and destinations between which they are transported.

An analysis of commodity flows by weight is the fundamental approach to a freight study, as the weight of commodities is important in understanding the ways in which freight vehicles are using the transportation system and how those vehicles affect the freight infrastructure. Understanding how freight vehicles travel along New Jersey's transportation infrastructure is also critical when addressing factors such as congestion, capacity, infrastructure investment, economic development, and quality of life. All data is reported for calendar year 2003. All tonnages quoted in this report represent short tons (2000 lbs). For trucks, truckload equivalents are also presented.

To gain a more complete picture of the characteristics of freight movements within New Jersey, however, it is also important to consider the value of the products being transported into, out of, within, and through the state. While the TRANSEARCH commodity flow database purchased for this study did not include a value component, estimates of average commodity values per ton were derived from the Bureau of Transportation Statistics 2002 Commodity Flow Survey (CFS), inflated to 2003 values, and applied to the truck and rail data using the proprietary FreightTools$_{CS}$ software package. The ACOE-sourced waterborne data and PANYNJ-sourced air cargo data did not provide sufficient commodity-level detail to permit application of tons-to-dollars conversion factors; other methods (described in Section 2) were used to develop order-of-magnitude approximations for purposes of this report. Also, it is important to remember that since most of the state's waterborne and airborne cargo has a linked truck or rail trip (delivery to/from the airport or seaport), the value of most air and water tonnage is actually captured in the truck or rail data.

1.4 Organization of this Report

The remainder of this report is organized as follows:

- Section 2.0 – Statewide Freight Data;
- Section 3.0 – Analysis of Modes;
- Section 4.0 – Analysis of Commodities;
- Section 5.0 – Analysis of Trading Partners; and
- Section 6.0 – Conclusion.

2.0 Statewide Freight Data

2.1 Overview

Over 620 million tons of freight were transported into, out of, within, and through New Jersey in 2003, representing roughly $860 billion in value of goods transported. Tables 1 and 2 below provides a summary of this information by mode.

Table 1. Summary of Estimated 2003 Statewide Freight Flows by Weight

Flow Type	Total	Estimated Weight (Short Tons)			
		*Truck	**Rail	***Water	****Air
Inbound	199,001,448	103,873,482	22,518,945	72,069,000	540,021
Outbound	164,661,920	117,584,251	10,974,367	35,679,000	424,302
Intrastate	131,015,146	126,807,290	294,856	3,913,000	0
Through	125,840,867	118,059,233	7,781,634	Unknown	Unknown
TOTAL	**620,519,381**	**466,324,256**	**41,569,802**	**111,661,000**	**964,323**

Source: Cambridge Systematics analysis of various data sources:

* Truck estimates were derived from the TRANSEARCH database.

** Rail estimates were derived from the Federal Railroad Administration Waybill Sample.

*** Water estimates were derived from the U.S. Army Corps of Engineers data. Outbound tonnage includes 27,522,000 tons domestic plus 8,157,000 tons international exports. Inbound tonnage includes 18,581,000 tons domestic plus 53,488,000 tons international imports. The U.S. Army Corps of Engineers provides through tonnage for certain navigation channels, but not for the state as a whole.

**** Air estimates were derived from the Port Authority of New York and New Jersey's 2003 Airport Traffic Report, which included domestic and international revenue freight and revenue mail totals, but not by direction. The percentage of outbound tonnage was estimated at 44% based on year 2000 data from the Port Authority of New York and New Jersey (total Newark Liberty International Airport tonnage of 1,193,392 tons freight and mail) and the Bureau of Transportation Statistics "New Jersey Transportation Profile" (enplaned Newark Liberty International Airport tonnage of 527,655 tons freight and mail); inbound tonnage was estimated at 100%-44% = 56%. Estimates of intrastate and through tonnage could not be derived from these sources.

Table 2. Summary of Estimated 2003 Statewide Freight Flows by Value

Flow Type	Total	Estimated Value ($ Billions)			
		*Truck	**Rail	***Water	****Air
Inbound	411	262	36	90	23
Outbound	312	232	17	45	18
Intrastate	137	131	1	5	0
Through	Unknown	Unknown	Not Estimated	Unknown	Unknown
TOTAL	**860**	**625**	**54**	**140**	**41**

Source: Cambridge Systematics analysis of various data sources:

* Truck estimates were derived from the TRANSEARCH database and FreightTools$_{CS}$. The value of through tonnage could not be determined from available data.

** Rail estimates were derived from the Federal Railroad Administration Waybill Sample and FreightTools$_{CS}$.. The value of through tonnage was not estimated.

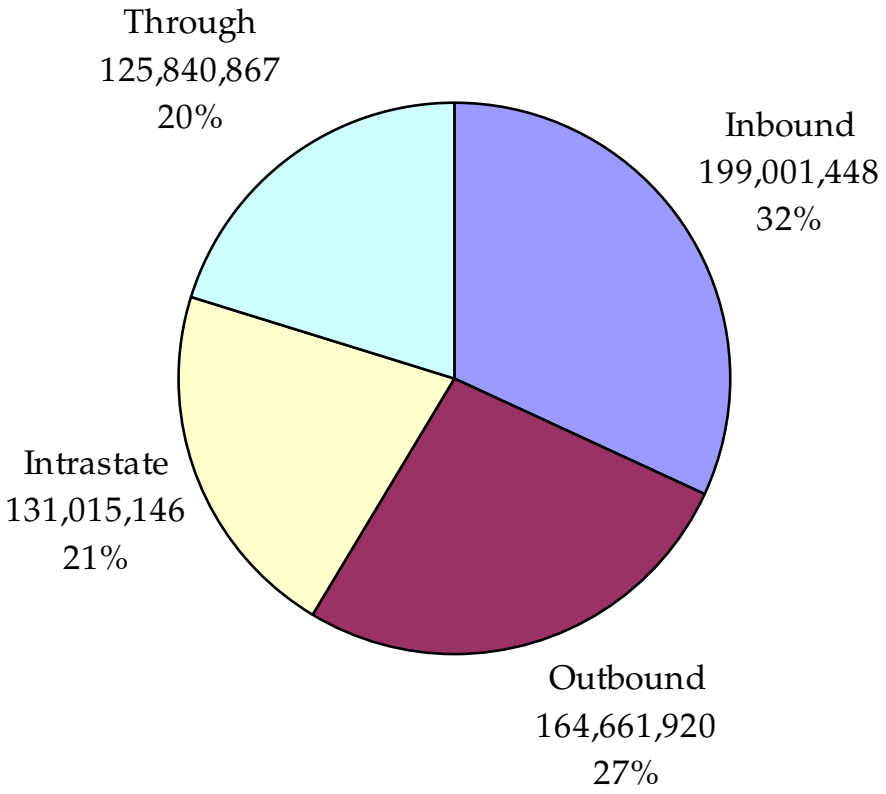
*** Water estimates were derived using the Bureau of Transportation Statistics "New Jersey Transportation Profile," which reports the value of import/export cargo through the bi-state Port of New York and New Jersey (PONYNJ) at $80.9 billion in year 2000. The Port Authority of New York and New Jersey website reports import/export tonnage of 64,817,274 tons for PONYNJ in year 2000. This yields a value factor of approximately $1,250 per ton. This factor was applied to all New Jersey waterborne tonnage, including public and private terminals, and including both international and domestic traffic; the composition and corresponding unit values of different ports and of international and domestic traffic may differ, so the resulting estimate should be used only for generalized order-of-magnitude comparison purposes.

**** Air estimates were derived from the Port Authority of New York and New Jersey's 2003 Airport Traffic Report, which reports 252,120 tons of international freight for Newark Liberty International Airport in year 2000, and from the Bureau of Transportation Statistics "New Jersey Transportation Profile," which reports a value of $10.6 billion for international trade through Newark Liberty International Airport. This yields a value factor of approximately $42,000 per ton. This factor was applied to all Newark Liberty International Airport tonnage, including both international and domestic traffic; the composition and corresponding unit values of international and domestic traffic may differ, so the resulting estimate should be used only for generalized order-of-magnitude comparison purposes.

2.2 Directional Summary

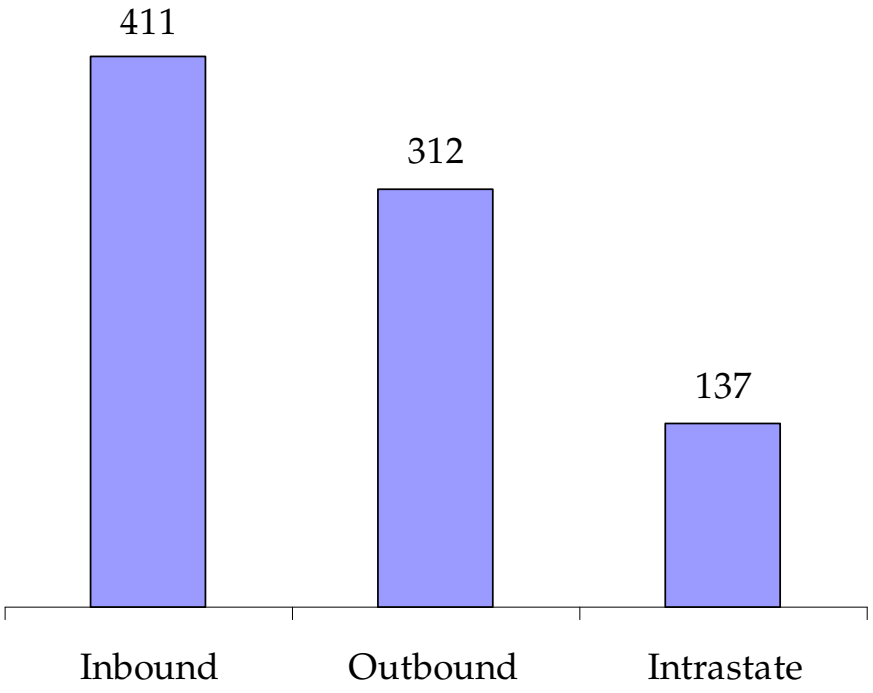
Inbound moves represent the largest share of tonnage and value. On a tonnage basis, each type of move – inbound, outbound, intrastate, and through – makes a significant contribution to total freight flows.

Figure 1. Direction of Estimated 2003 Statewide Freight Flows in Short Tons



Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data.
Note: Through tonnage for water and air modes could not be estimated due to limitations of data sources.

Figure 2. Direction of Estimated 2003 Statewide Freight Flows in Dollars ($ billion)



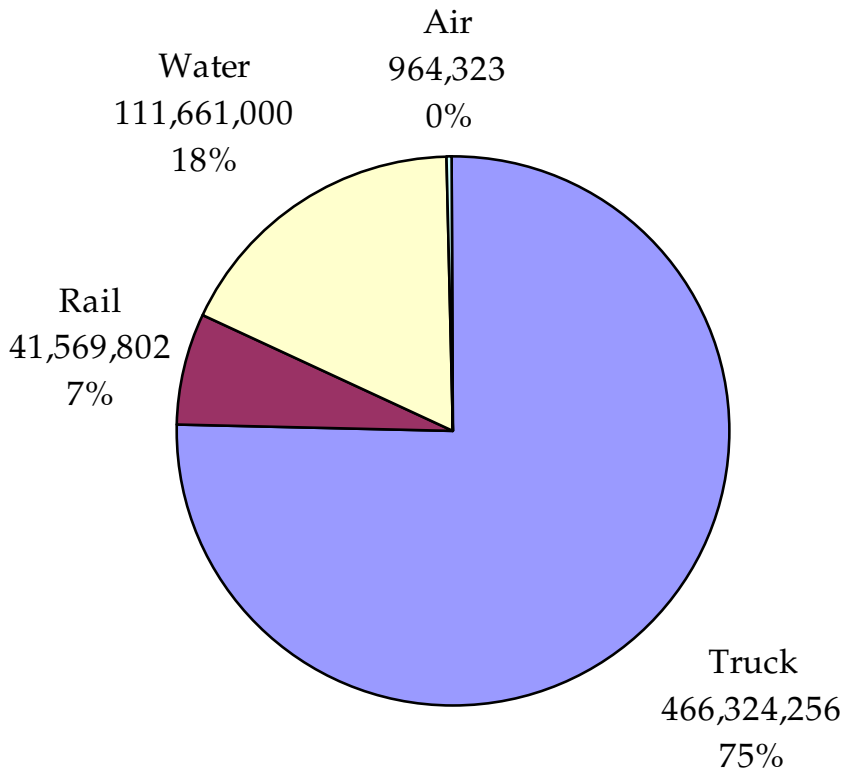
Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data. Tonnage data was processed with additional conversion factors from FreightTools$_{CS}$, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics. These are order of magnitude estimates for comparison purposes only.

Notes: Through value could not be estimated due to limitations of data sources.

2.3 Mode Share Summary

Like most states, New Jersey is highly dependent on trucks for movement of much of its freight. But New Jersey is also well-represented by other modes, which are critically important to its overall intermodal goods movement system. Note that air cargo accounts for less than 1% of tonnage but almost as much value as rail.

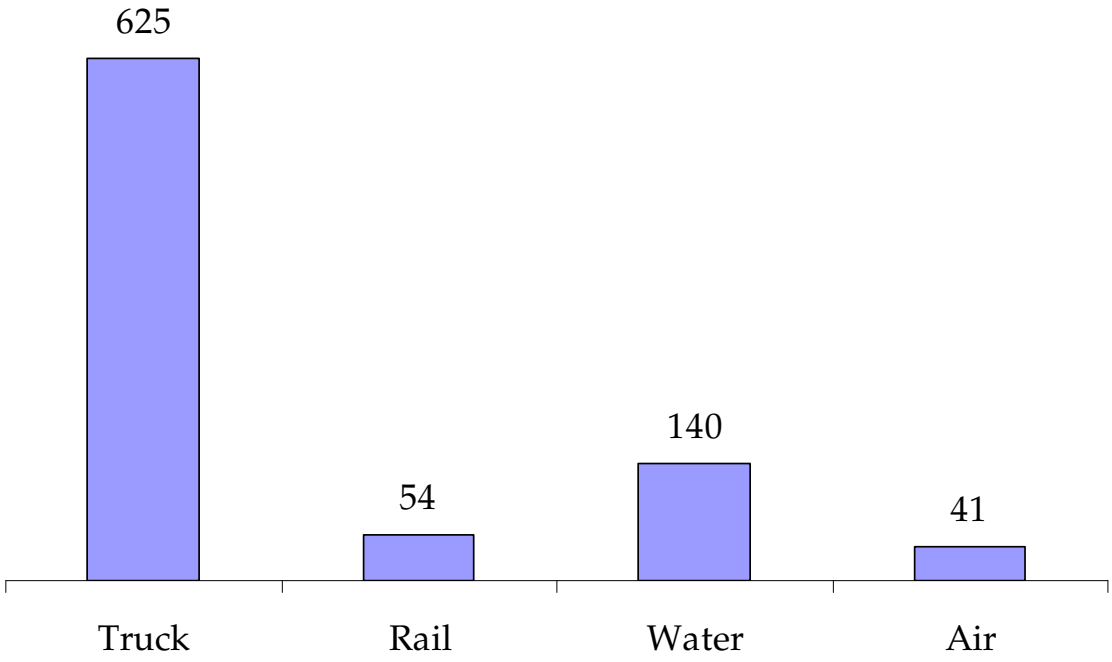
Figure 3. Estimated Statewide 2003 Freight Flows by Mode in Short Tons



Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data.

Note: Through tonnage for water and air modes could not be estimated due to limitations of data sources.

Figure 4. Estimated Statewide 2003 Freight Flows by Mode in Dollars ($ billion)



Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data. Tonnage data was processed with additional conversion factors from FreightTools$_{CS}$, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics. These are order of magnitude estimates for comparison purposes only.

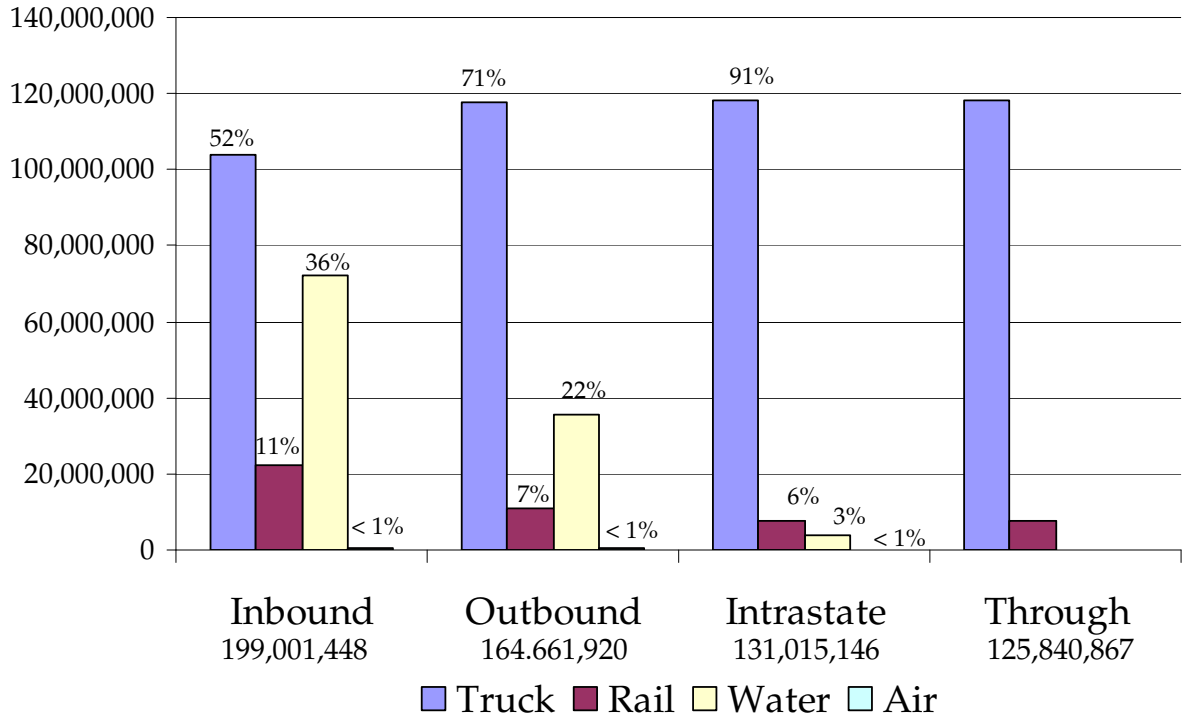
Notes: Through value could not be estimated due to limitations of data sources

Mode Share of Tonnage by Direction

Trucks represent an estimated 52% of inbound tonnage, 71% of outbound tonnage, 91% of intrastate tonnage, and the majority of through tonnage that can be estimated based on available data sources. Trucking is clearly the dominant overall mode, although other modes carry significant shares of tonnage, especially on the inbound side. Much of the tonnage moving inbound via rail and water generates corresponding tonnage moving intrastate or outbound via truck; also, intrastate moves are of a sufficiently short distance that other modes are disadvantaged compared to truck.

Rail represents an estimated 11% of inbound tonnage, 7% of outbound tonnage, 6% of intrastate tonnage, and a portion of through tonnage that can be estimated based on available data sources. Water represents an estimated 36% of inbound tonnage, 22% of outbound tonnage, and 3% of intrastate tonnage. Air represents less than 1% of tonnage.

Figure 5. Estimated 2003 Statewide Freight Flows by Direction and Mode in Short Tons *(Percentages Represent Share of Traffic by Each Mode)*



Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data.
Note: Through tonnage for water and air modes could not be estimated due to limitations of data sources. As a result, modal shares (percentage) of through tonnage are not shown.

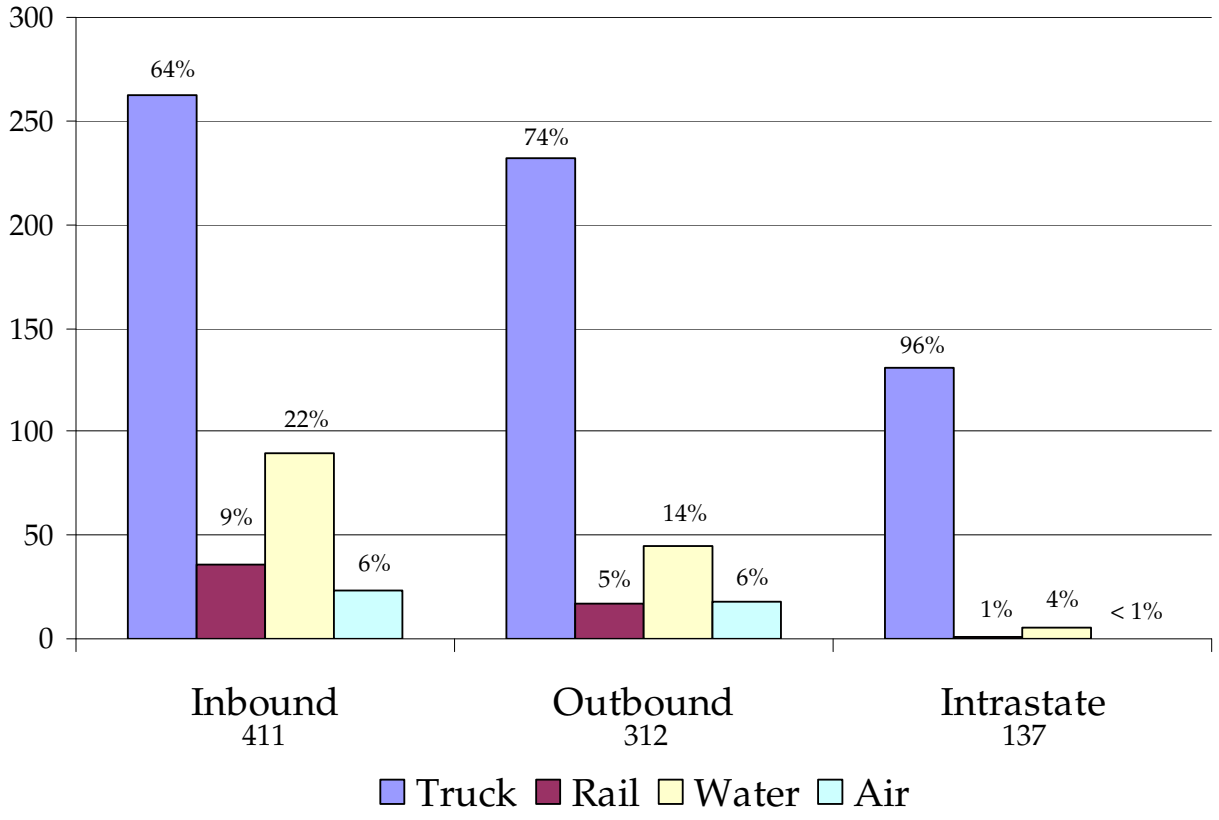
Mode Share of Value by Direction

Trucks represent an estimated 64% of inbound value, 74% of outbound value, and 96% of intrastate value. Truck shares of value are higher than truck shares of tonnage, indicating that on average, trucks carry relatively high-value commodities.

Rail represents an estimated 9% of inbound value, 5% of outbound value, and 1% of intrastate value. Water represents an estimated 22% of inbound value, 14% of outbound value, and 4% of intrastate value. Rail and water shares of value are lower than rail and water shares of tonnage, indicating that on average, rail and water carry lower-value commodities. These modes do handle high value intermodal shipments, but lower value bulk shipments account for the majority of their tonnage, as discussed in Section 3.

Air represents less than 1% of tonnage, but accounts for 6% of inbound and 6% of outbound value. Air specializes in high-value, low-weight commodities.

Figure 6. Estimated 2003 Statewide Freight Flows by Direction and Mode in Dollars ($ billion)
(Percentages Represent Share of Traffic by Each Mode)



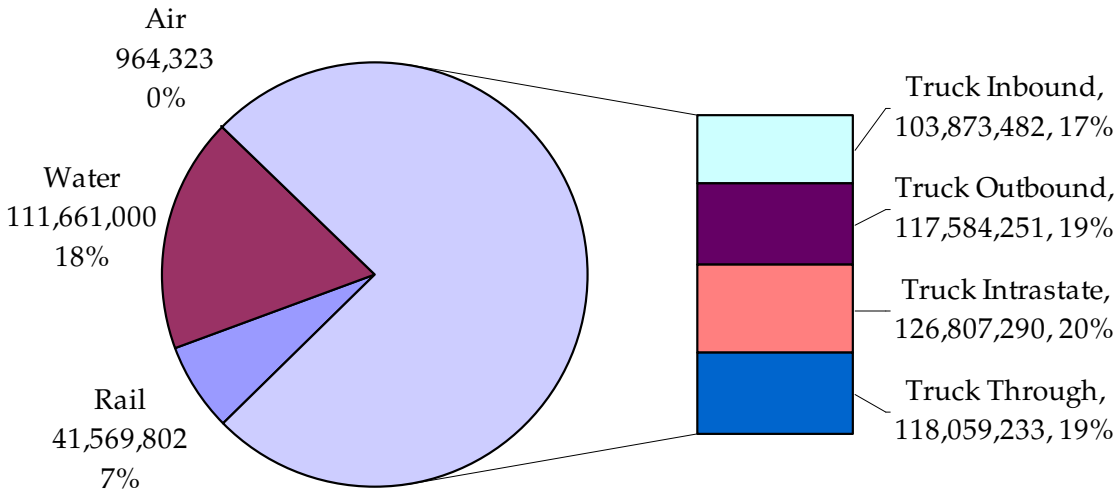
Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data. Tonnage data was processed with additional conversion factors from FreightTools$_{CS}$, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics.
Note: Through value could not be estimated due to limitations of data sources.

3.0 Analysis by Mode

3.1 Truck Mode

Trucks represent approximately 75% of New Jersey tonnage (around 466 million tons), and provide critical first mile/last mile connections for rail, water, and air cargo. This 75% is relatively evenly divided between inbound (17%), outbound (19%), intrastate (20%), and through traffic (19%) components.

Figure 7. Estimated 2003 Statewide Freight Flows by Direction in Short Tons
(With Breakout of Truck Tons)



Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data.
Note: Through tonnage for water and air modes could not be estimated due to limitations of data sources.

Inbound Truck Movements

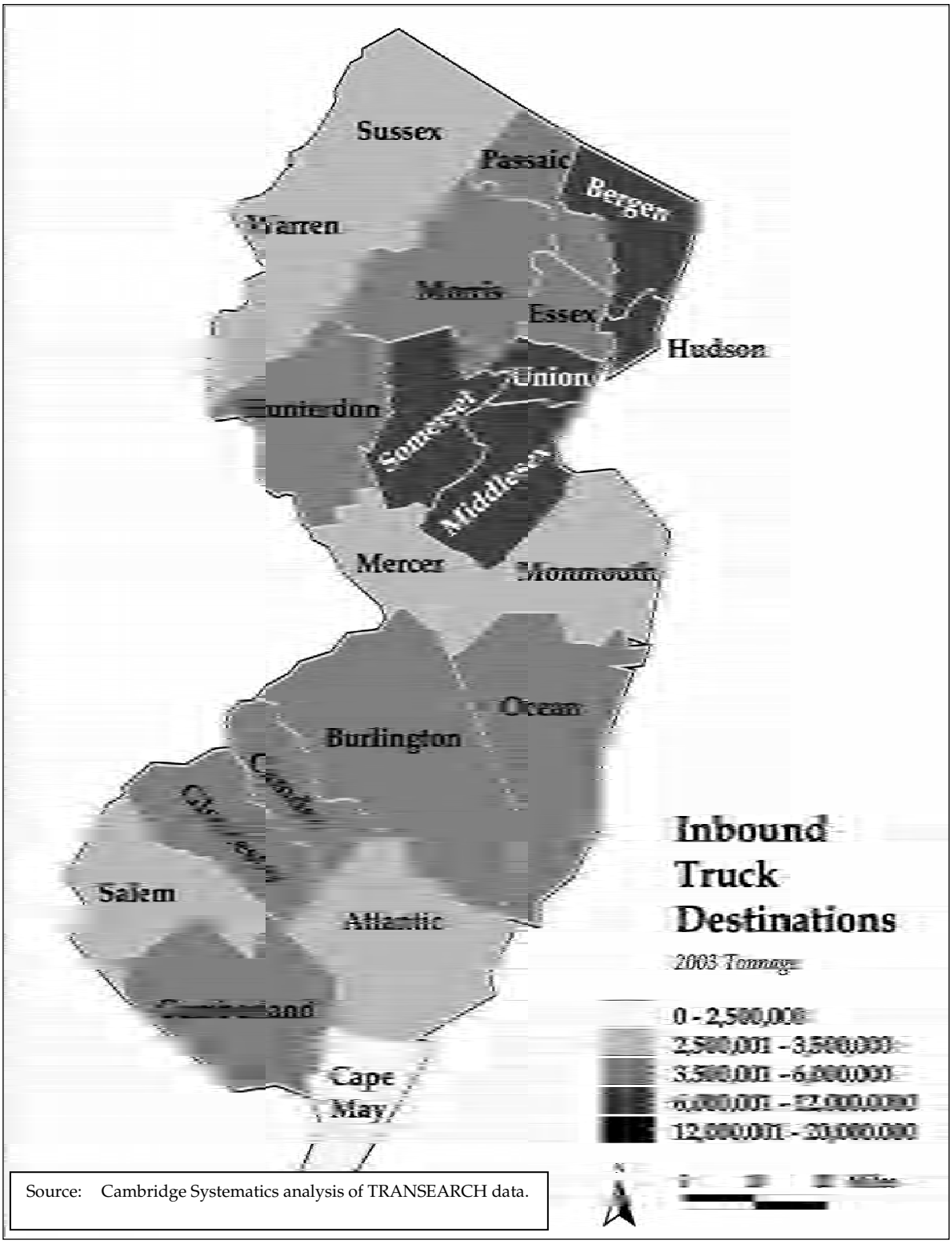
Every county experiences a significant level of inbound truck movement. In terms of truckload equivalents (truck tonnage divided by the average payload weight for a given commodity class), the greatest impacts are on Bergen, Middlesex, Hudson, Union, and Somerset counties.

Table 3. Destination Counties for Inbound Truck Moves (by Truckload Equivalents, Weight, and Value), 2003

Destination County	Inbound Truckloads	Share of Truckloads	Inbound Weight (Short Tons)	Inbound Value ($ Billions)
Bergen	698,184	10%	10,678,894	$20.4
Middlesex	694,720	10%	9,669,831	$17.7
Hudson	579,470	8%	7,546,188	$14.4
Union	458,328	7%	6,533,518	$15.0
Somerset	451,684	7%	6,272,522	$12.4
Camden	378,214	5%	5,933,075	$14.9
Essex	371,955	5%	5,564,377	$13.7
Morris	361,391	5%	5,372,489	$13.1
Burlington	339,267	5%	5,303,128	$14.0
Passaic	295,930	4%	4,568,497	$12.6
Gloucester	250,717	4%	4,008,683	$11.3
Cumberland	243,622	4%	3,889,997	$11.9
Mercer	234,341	3%	3,422,171	$10.5
Ocean	223,201	3%	3,605,508	$10.2
Monmouth	223,019	3%	3,431,964	$11.1
Hunterdon	220,935	3%	3,532,994	$10.6
Warren	196,206	3%	3,182,569	$10.1
Atlantic	192,327	3%	3,033,542	$10.0
Sussex	179,835	3%	3,019,044	$9.8
Salem	176,831	3%	2,859,632	$9.7
Cape May	153,036	2%	2,444,858	$8.4
TOTAL	**6,923,212**	**100%**	**103,873,482**	**$262**

Source: Cambridge Systematics analysis of TRANSEARCH data and FreightTools$_{CS}$.
Note: Columns may not sum precisely to totals due to rounding.

Figure 8. Destination Counties for Inbound Truck Tonnage (Short Tons), 2003



Source: Cambridge Systematics analysis of TRANSEARCH data.

Outbound Truck Movements

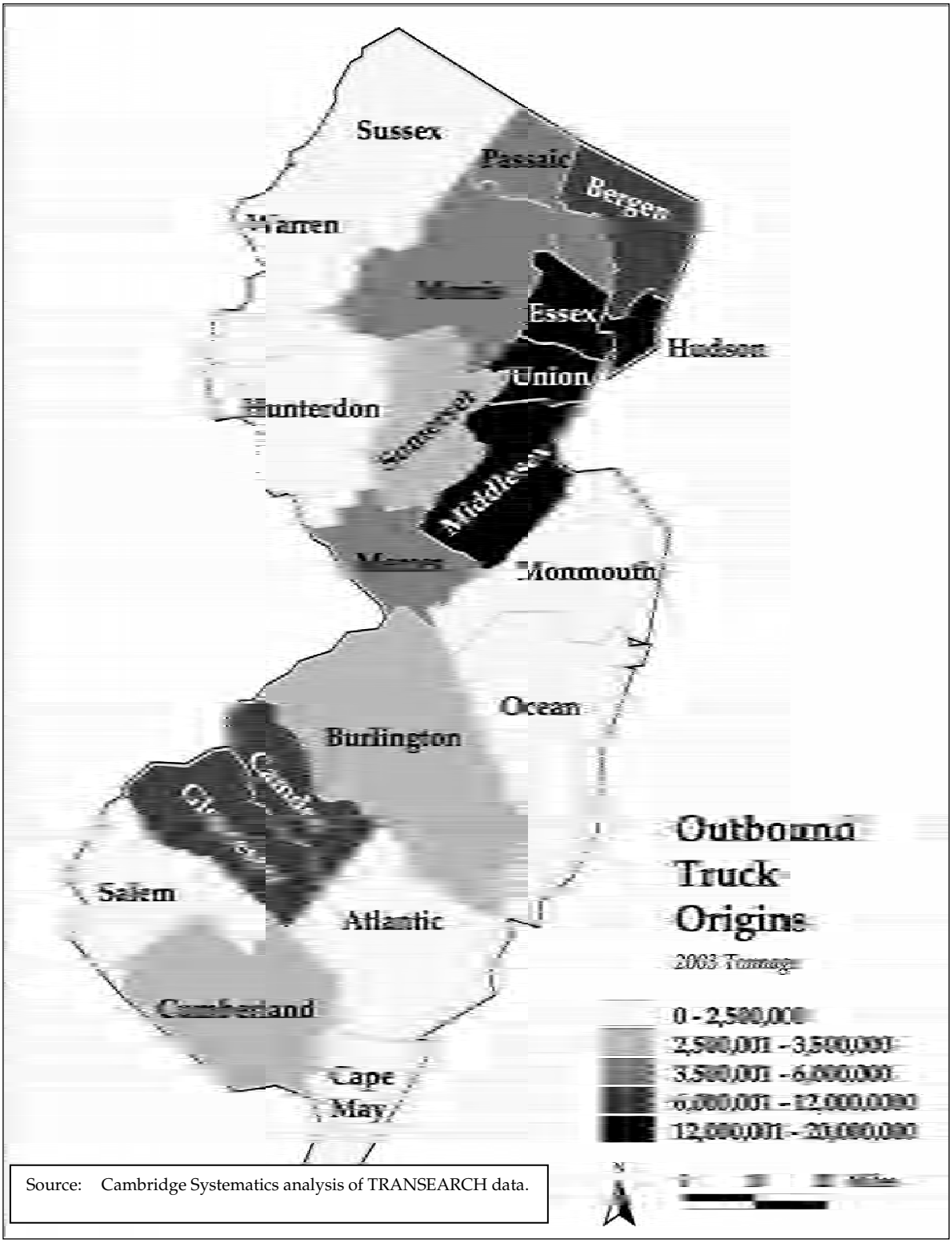
As can be seen in Table 4 below and Figure 9 on the following pages, there are significant differences between counties in terms of outbound truck tonnage – much more so than was seen for inbound truck tonnage. Much of this difference has to do with the location of key industrial clusters and intermodal facilities (seaports, airports, railyards, and warehouse/distribution centers) that generate significant numbers of outbound trucks.

Table 4. Origin Counties for Outbound Truck Moves (by Truckload Equivalents, Weight, and Value), 2003

Origin County	Outbound Truckloads	Share of Truckloads	Outbound Weight (Short Tons)	Outbound Value ($ Billions)
Union	1,393,010	17%	19,899,284	$29.1
Middlesex	1,100,080	14%	16,680,062	$24.0
Essex	1,004,083	12%	14,322,963	$26.3
Hudson	1,001,122	12%	13,347,142	$16.1
Bergen	667,454	8%	9,294,181	$21.7
Gloucester	519,377	6%	8,946,929	$13.5
Camden	419,157	5%	6,125,735	$13.5
Passaic	341,779	4%	4,970,471	$13.4
Morris	291,402	4%	4,174,419	$12.6
Mercer	252,884	3%	3,659,129	$10.2
Burlington	219,167	3%	3,226,866	$10.7
Somerset	208,533	3%	2,990,873	$8.6
Cumberland	197,668	2%	3,077,216	$6.6
Monmouth	141,383	2%	2,192,103	$6.4
Atlantic	75,984	1%	1,330,979	$3.2
Hunterdon	59,529	1%	900,213	$4.3
Warren	45,542	1%	643,984	$3.2
Ocean	43,058	1%	655,263	$3.3
Salem	42,161	1%	666,920	$2.4
Sussex	20,652	0%	295,530	$2.2
Cape May	11,723	0%	183,984	$0.8
TOTAL	**8,055,747**	**100%**	**117,584,251**	**$232**

Source: Cambridge Systematics analysis of TRANSEARCH data and FreightTools$_{CS}$.
Note: Columns may not sum precisely to totals due to rounding.

Figure 9. Origin Counties for Outbound Truck Tonnage (Short Tons), 2003



Source: Cambridge Systematics analysis of TRANSEARCH data.

Intrastate Truck Movements

The truck mode is by far the dominant mode for shipments between points within New Jersey, comprising around 96% of intrastate tonnage. There are many different shipment pairs that are important – the top 20 comprise just 33% of total intrastate truckloads.

Table 5. Top 20 Origin-Destination Pairs for Intrastate Truck Traffic, 2003

Origin County	Destination County	Total Truckloads	Share of Truckloads	Weight (Short Tons)	Value ($ Billions)
Cumberland	Gloucester	572,552	5%	7,785,901	$0.6
Cumberland	Mercer	451,739	4%	3,655,009	$0.5
Cumberland	Camden	417,802	3%	5,675,082	$0.6
Hudson	Morris	244,679	2%	2,057,758	$0.4
Hudson	Middlesex	224,294	2%	1,887,266	$0.4
Cumberland	Cumberland	220,943	2%	2,992,535	$0.5
Gloucester	Middlesex	199,281	2%	1,696,771	$0.6
Hudson	Union	195,346	2%	1,643,035	$0.4
Cumberland	Burlington	185,384	1%	2,473,294	$0.7
Cumberland	Salem	158,740	1%	2,143,246	$0.5
Middlesex	Morris	145,824	1%	1,269,639	$0.6
Union	Morris	142,483	1%	1,193,003	$0.8
Middlesex	Middlesex	127,805	1%	1,079,234	$0.5
Hudson	Bergen	124,793	1%	1,037,692	$0.2
Ocean	Hudson	124,517	1%	1,016,232	$0.3
Middlesex	Union	122,565	1%	1,088,066	$0.5
Union	Hudson	121,316	1%	1,033,501	$0.8
Union	Middlesex	115,816	1%	986,560	$0.7
Middlesex	Hudson	114,193	1%	1,020,128	$0.6
Cape May	Gloucester	112,693	1%	1,538,556	$0.3
Subtotal of Top 20 Pairs		4,122,767	33%	43,272,506	$10.5
Subtotal of Other Pairs (421)		8,405,441	67%	83,534,787	$121.5
TOTAL		**12,528,208**	**100%**	**126,807,293**	**$132.0**

Source: Cambridge Systematics analysis of TRANSEARCH data and FreightTools$_{CS}$.
Note: Columns may not sum precisely to totals due to rounding.

Through Truck Movements

TRANSEARCH through data was obtained separately from the primary database. Basically, the entire TRANSEARCH dataset (all counties to all counties, everywhere) had to be assigned to a national highway network. Next, the flows that "touch" New Jersey were identified and reported out of the data as a series of origin-destination pairs with associated tonnages. CS then worked with this data to identify and tabulate just those origin-destination pairs where both ends of the trip were outside of New Jersey.

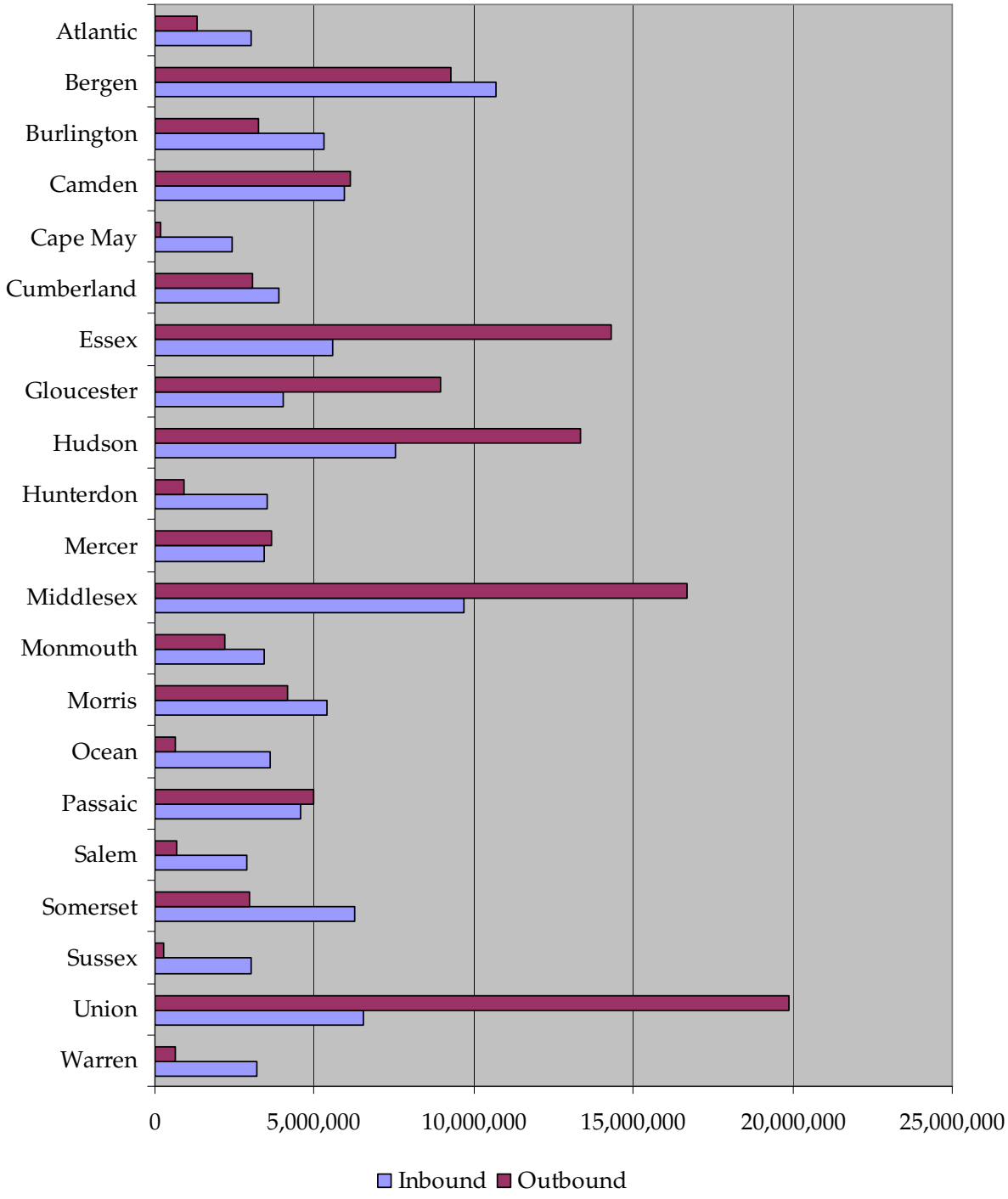
Through truck tonnage is estimated at over 118 million tons, and represented roughly one-fourth of all truck tonnage for New Jersey. While inbound, outbound, and intrastate moves include a mix of shorter and longer trips, through traffic is primarily moving substantial distances within the state. Therefore, the actual impact of through traffic, in terms of vehicle miles traveled over New Jersey highways, is clearly greater than 25%.

The actual routing assignments of the through tonnage were not obtained, but this information may be of future interest in identifying the extent to which critical corridors – I-95/New Jersey Turnpike, I-78, I-80, I-287, et al – are impacted.

Summary of Truck Movements by County

Figure 10 on the following page illustrates inbound and outbound truck tonnages by county. Note the relatively even distribution of inbound truck tonnage, relative to the significant differences with respect to outbound truck tonnage.

Figure 10. Estimated Inbound and Outbound Truck Tonnage (Short Tons) by County, 2003

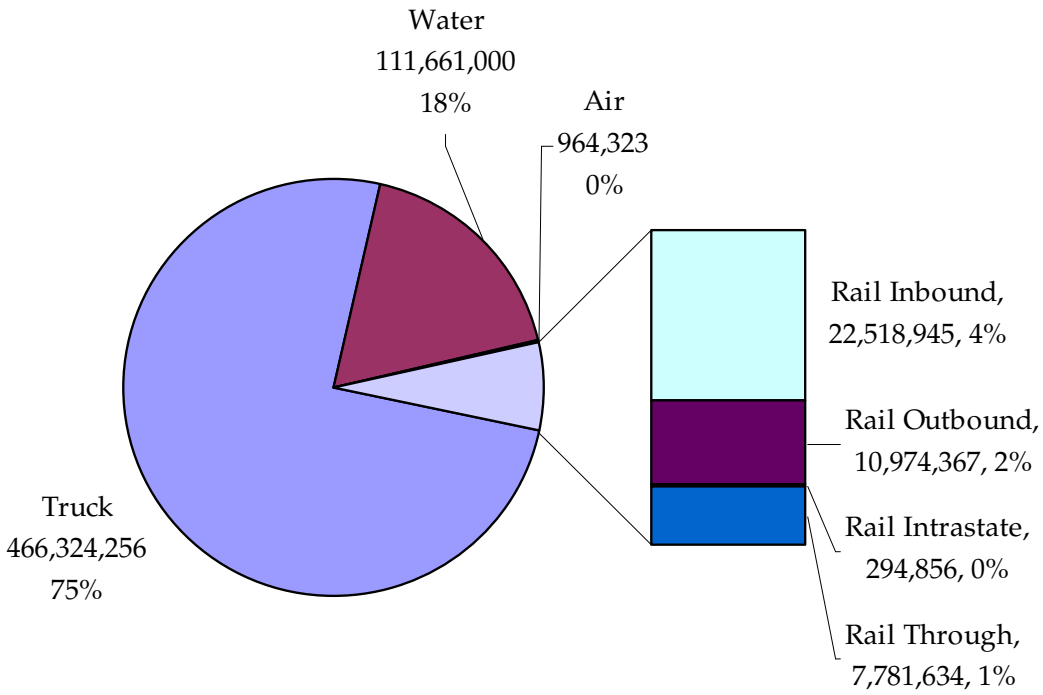


Source: Cambridge Systematics analysis of TRANSEARCH data.

3.2 Rail Mode

Rail represents nearly 7% of total tonnage (around 43 million tons). It serves high-weight commodities, accommodates long-haul movement of containers and autos, and links seaports with inland markets. Around half the tonnage is inbound (54%); around one-quarter is outbound (26%); a small share is intrastate (1%); and the rest is through (19%).

Figure 11. Estimated 2003 Statewide Freight Flows by Direction in Short Tons
(With Breakout of Rail Tons)



Source: Cambridge Systematics analysis of TRANSEARCH, Federal Railroad Administration, U.S. Army Corps of Engineers, Port Authority of New York and New Jersey, and Bureau of Transportation Statistics data.
Note: Through tonnage for water and air modes could not be estimated due to limitations of data sources.

Inbound Rail Movements

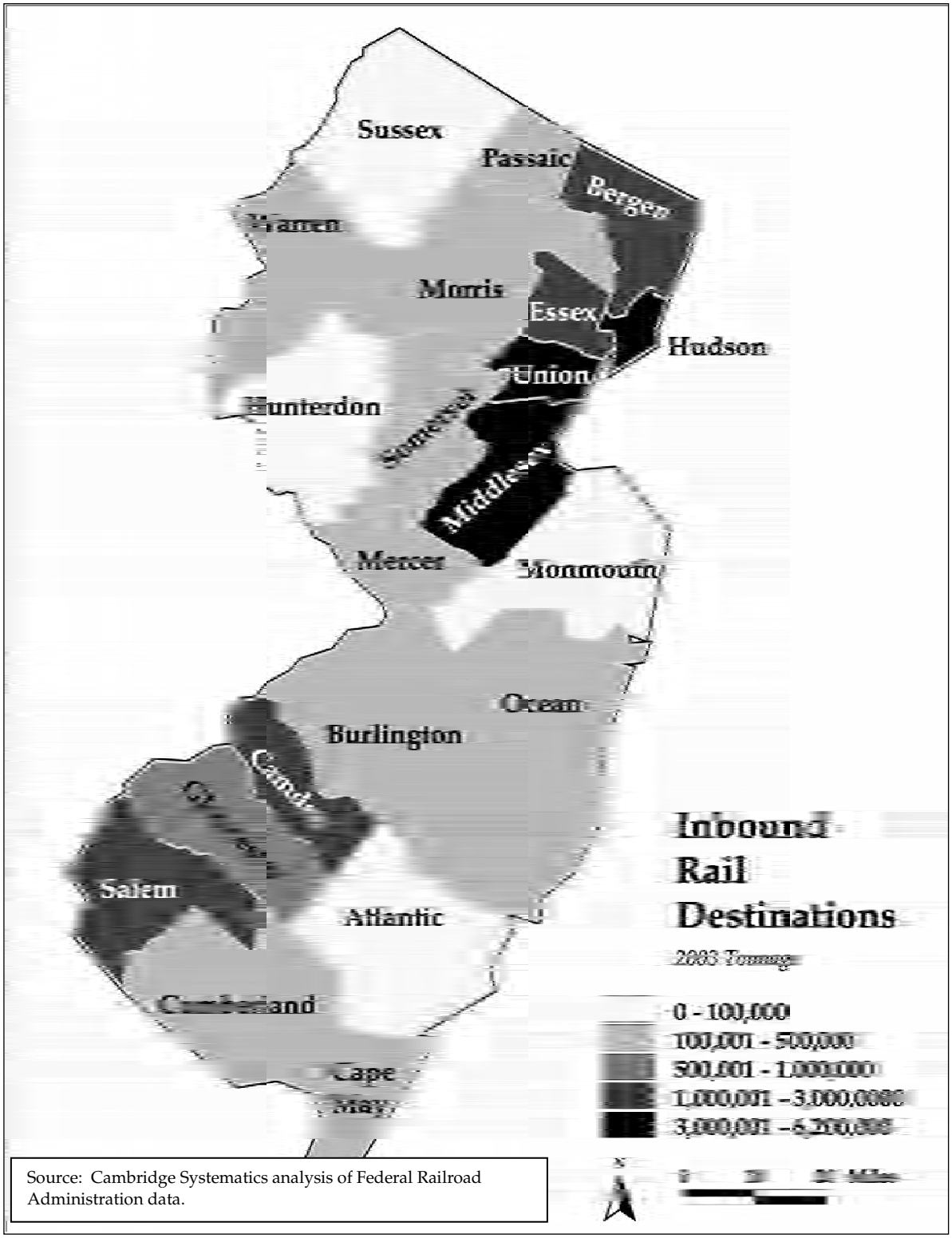
Rail represents around 22.5 million tons (11% of New Jersey's inbound tonnage). Rail is often broken out into different "submodes" – intermodal (the movement of shipping containers), unit bulk (long trains carrying a single bulk commodity such as coal or grain), and carload (different types of railcars and commodities). Non-intermodal shipments comprise 66 percent of inbound rail tonnage to New Jersey, while intermodal shipments comprise 34 percent. On average, non-intermodal railcars carry substantially more tonnage (around 50 tons for a loaded car) than intermodal railcars (around 15 per loaded container) so the percentage of intermodal traffic is substantially higher on a per-unit basis. Facilities in Middlesex, Essex, and Hudson counties are the top recipients of carload tonnage, while Hudson and Union Counties are the dominant receivers of intermodal.

Table 6. Destination Counties for Inbound Rail Moves (by Railcars, Weight, and Value), 2003

Destination County	Carload (Short Tons)	Carload Share	Intermodal (Short Tons)	Intermodal Share	Total Weight (Short Tons)	Total Share	Value ($ Billions)
Hudson	1,829,036	12%	4,278,600	56%	6,107,636	27%	$4.4
Union	811,920	5%	2,783,320	36%	3,595,240	16%	$5.2
Middlesex	3,047,460	20%	0	0%	3,047,460	14%	$6.5
Essex	2,070,408	14%	232,360	3%	2,302,768	10%	$4.1
Bergen	1,252,084	8%	333,040	4%	1,585,124	7%	$3.6
Camden	1,270,480	9%	800	0%	1,271,280	6%	$1.9
Salem	1,159,157	8%	0	0%	1,159,157	5%	$1.0
Gloucester	889,296	6%	0	0%	889,296	4%	$2.5
Burlington	494,348	3%	0	0%	494,348	2%	$2.0
Cape May	479,928	3%	0	0%	479,928	2%	$0.0
Passaic	294,020	2%	0	0%	294,020	1%	$0.4
Somerset	258,920	2%	0	0%	258,920	1%	$0.8
Cumberland	211,976	1%	0	0%	211,976	1%	$0.5
Warren	190,880	1%	0	0%	190,880	1%	$0.7
Morris	188,480	1%	0	0%	188,480	1%	$0.8
Mercer	177,120	1%	0	0%	177,120	1%	$0.8
Ocean	101,760	1%	0	0%	101,760	0%	$0.4
Hunterdon	63,920	0%	0	0%	63,920	0%	$0.3
Monmouth	58,492	0%	0	0%	58,492	0%	$0.3
Sussex	33,700	0%	0	0%	33,700	0%	$0.1
Atlantic	7,440	0%	0	0%	7,440	0%	$0.0
TOTAL	**14,890,825**	**100%**	**7,628,120**	**100%**	**22,518,946**	**100%**	**$36.2**

Source: Cambridge Systematics analysis of Federal Railroad Administration data and FreightTools$_{CS}$.
Note: Columns may not sum precisely to totals due to rounding.

Figure 12. Destination Counties for Inbound Rail Tonnage (Short Tons), 2003



Source: Cambridge Systematics analysis of Federal Railroad Administration data.

Outbound Rail Movements

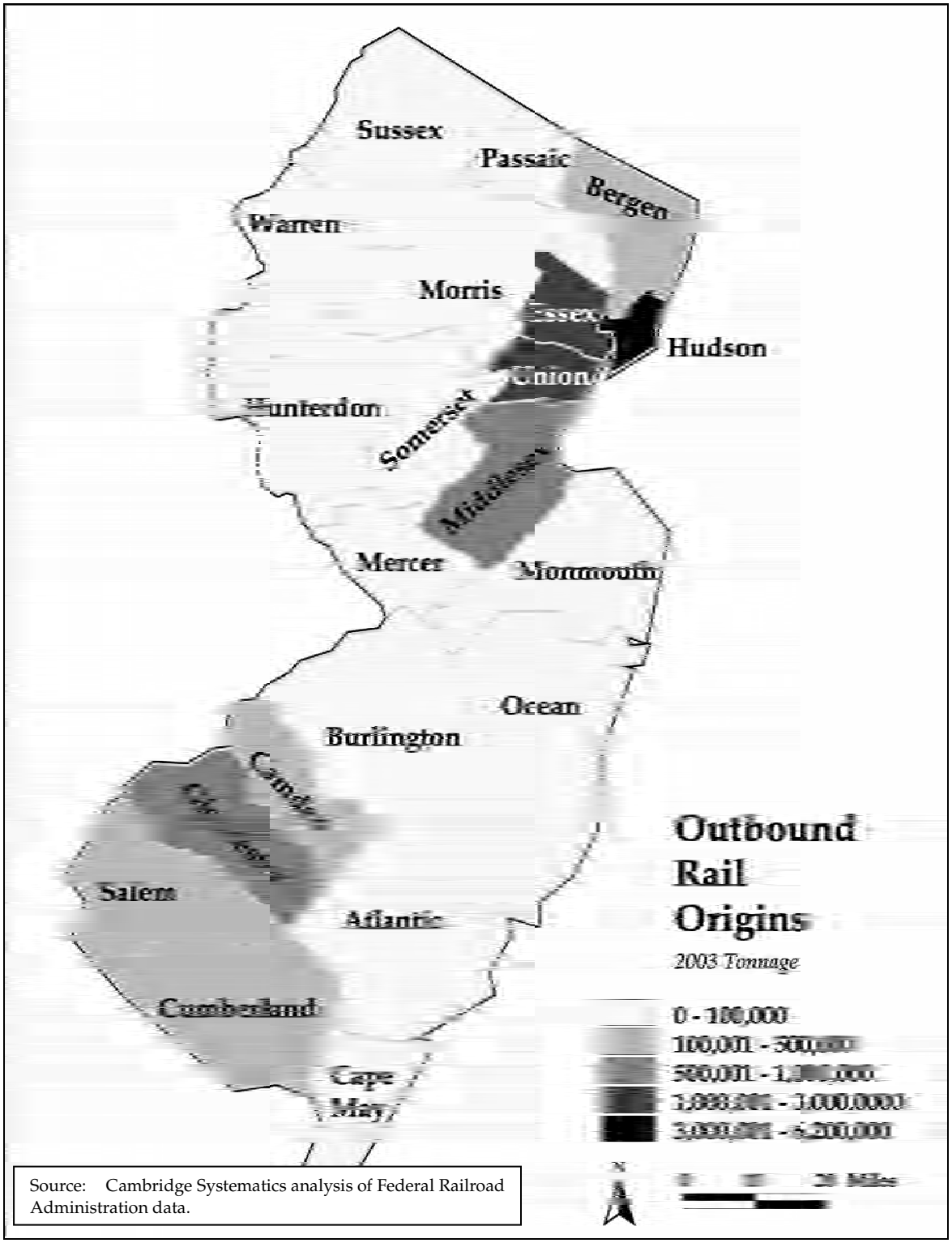
Rail shipments account for around 11 million tons (nearly 7%) of New Jersey's outbound tonnage. The majority of tonnage originates from rail terminals in Hudson, Union, and Essex counties. Intermodal rail shipments comprise 54 percent of all outbound rail tons while carload shipments account for the remaining 46 percent. Facilities in Essex, Gloucester, Middlesex, Union and Hudson counties are the top shippers of carload tonnage, while Hudson and Union Counties are the dominant shippers of intermodal.

Table 7. Origin Counties for Outbound Rail Moves (by Railcars, Weight, and Value), 2003

Origin County	Carload (Short Tons)	Carload Share	Intermodal (Short Tons)	Intermodal Share	Total Weight (Short Tons)	Total Share	Value ($ Billions)
Hudson	646,887	13%	3,360,440	57%	4,007,327	37%	$2.9
Union	642,626	13%	1,906,600	32%	2,549,226	23%	$3.3
Essex	1,138,571	23%	305,000	5%	1,443,571	13%	$3.1
Gloucester	867,764	17%	800	0%	868,564	8%	$1.7
Middlesex	744,076	15%	0	0%	744,076	7%	$2.7
Bergen	51,920	1%	332,720	6%	384,640	4%	$0.6
Cumberland	343,471	7%	0	0%	343,471	3%	$0.2
Salem	255,312	5%	200	0%	255,512	2%	$0.8
Camden	158,928	3%	0	0%	158,928	1%	$0.5
Burlington	57,992	1%	0	0%	57,992	1%	$0.2
Mercer	51,440	1%	0	0%	51,440	0%	$0.2
Passaic	31,800	1%	0	0%	31,800	0%	$0.0
Warren	29,920	1%	0	0%	29,920	0%	$0.2
Ocean	11,760	0%	12,760	0%	24,520	0%	$0.2
Morris	9,040	0%	0	0%	9,040	0%	$0.1
Somerset	7,520	0%	0	0%	7,520	0%	$0.0
Hunterdon	6,820	0%	0	0%	6,820	0%	$0.0
TOTAL	**5,055,847**	**100%**	**5,918,520**	**100%**	**10,974,368**	**100%**	**$16.7**

Source: Cambridge Systematics analysis of Federal Railroad Administration data and FreightToolsCS.
Note: Columns may not sum precisely to totals due to rounding.

Figure 13. Origin Counties for Outbound Rail Tonnage (Short Tons), 2003



Source: Cambridge Systematics analysis of Federal Railroad Administration data.

Intrastate Rail Movements

Intrastate rail shipments currently account for around less than one percent of New Jersey's intrastate tonnage (0.3 million tons).

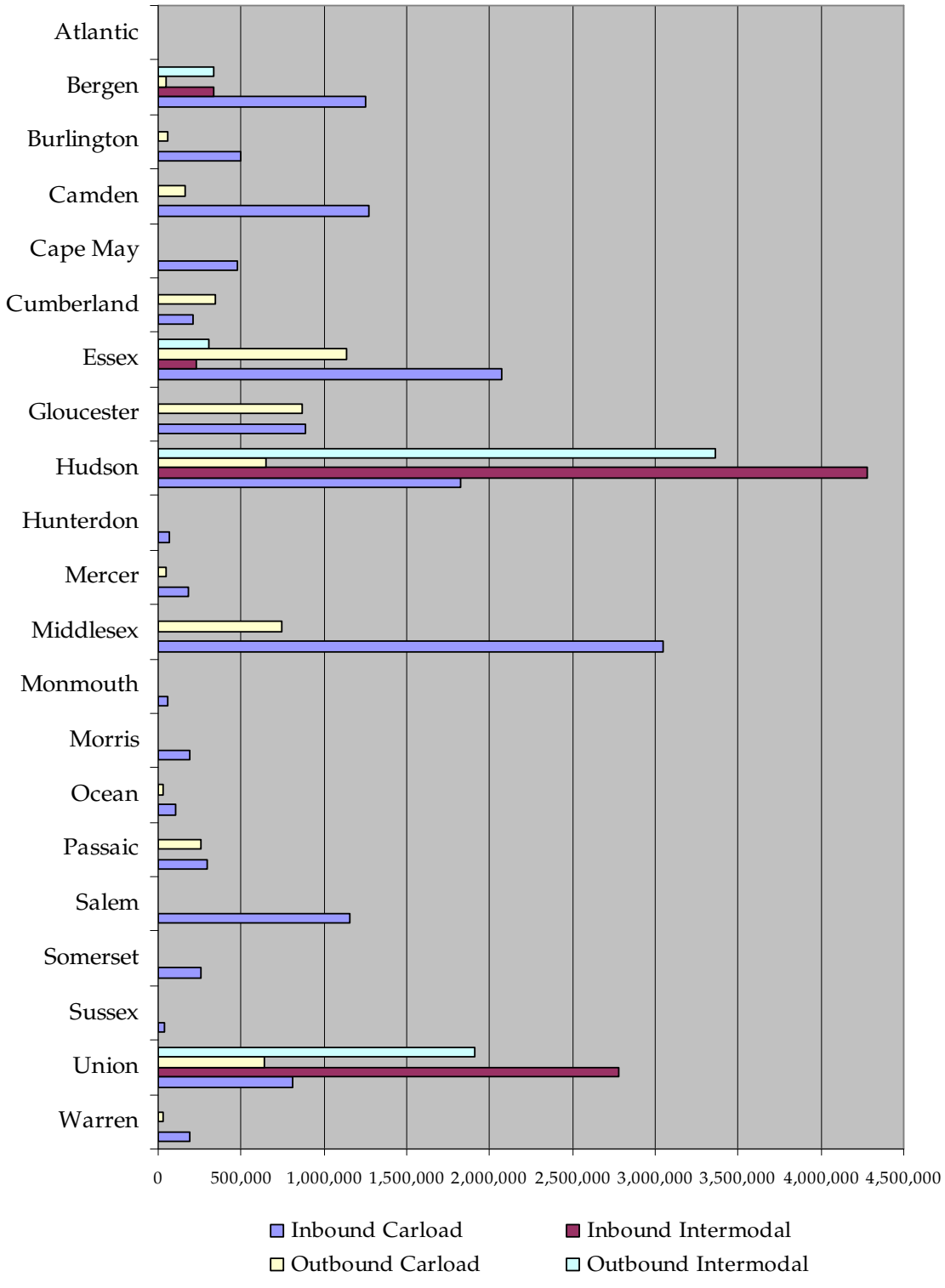
Through Rail Movements

Around 7.8 millions tons of rail traffic are pass-though, primarily between upstate New York and points south and west. This is only 2 percent of New Jersey's through traffic by weight, but it reflects a substantial share (around one-fifth) of all New Jersey rail tonnage.

Summary of Rail Movements by County

Figure 14 on the following page illustrates inbound and outbound rail tonnages by county. Note the dominance of inbound tonnage compared to outbound, and the clustering of carload and intermodal tonnage in selected counties.

Figure 14. Estimated Inbound and Outbound Rail Tonnage (Short Tons) by County, 2003



Source: Cambridge Systematics analysis of Federal Railroad Administration data.

3.3 Water Mode

Water represents around 18% of tonnage (nearly 112 million tons). New Jersey hosts some of the nation's leading port facilities, which accommodate major international trade as well as important domestic coastwise shipping activity. Nearly two-thirds of waterborne tonnage is inbound (65%); nearly one-third is outbound (32%); and a small share is intrastate (4%). Through tonnage is not represented in the waterborne data.

County-level detail on origins and destinations of waterborne freight is not available, but functional distinctions can be made based on type and direction of traffic. According to the ACOE, total tonnage (domestic plus international) for New Jersey is around 111.7 million tons. Around 61.7 million is international and around 50.0 million is domestic. Inbound tonnage is dominated by international traffic (53.5 million tons international, versus 18.6 million tons domestic). Outbound tonnage is dominated by domestic traffic (27.5 million tons domestic, versus 8.2 million tons international). This appears to be the result of two factors: international trade that heavily favors imports over exports; and re-shipment of inbound international commodities (primarily petroleum and petrochemical) to other states (primarily facilities in New York).

The TRANSEARCH waterborne data does not cover international traffic, but its domestic totals are very close to the ACOE's totals. TRANSEARCH reports around 49.1 million domestic tons, compared to around 50.0 for ACOE.

Table 8. Comparison of 2003 Statewide Waterborne Commerce Data

	Tonnage (Short Tons)					
		Outbound		Inbound		Internal
Source	Total	Domestic	Foreign	Domestic	Foreign	Domestic
U.S. Army Corps of Engineers	111,661,000	27,522,000	8,157,000	18,581,000	53,488,000	3,913,000
TRANSEARCH	49,147,844	28,139,454	N/A	16,474,935	N/A	4,533,455

Source: Cambridge Systematics analysis of U.S. Army Corps of Engineers data (Waterborne Commerce of the United States, National Summary for Year 2003, Part Five), and TRANSEARCH data.

The ACOE also reports separate tonnage for three leading New Jersey ports (Camden/Gloucester, Paulsboro, and New York/New Jersey). The total tonnage through all three ports is 180 million – roughly 68 million higher than the 112 million tons reported by the ACOE for all of New Jersey. Much of this difference is due to the fact that the New York/New Jersey total also includes tonnage moving through facilities in New York.

Table 9. Waterborne Commerce Data for Leading New Jersey Ports, 2003

Port Name	Tonnage (Short Tons)			
		Foreign		
	Total	Inbound	Outbound	Domestic
Camden-Gloucester, New Jersey	6,818,849	3,764,289	570,077	2,484,483
New York, New York, and New Jersey	145,889,166	70,251,263	9,433,511	66,204,392
Paulsboro, New Jersey	27,283,400	17,908,339	310,168	9,064,893
TOTAL	**179,991,415**	**91,923,891**	**10,313,756**	**77,753,768**

Source: Cambridge Systematics analysis of U.S. Army Corps of Engineers data (Waterborne Commerce of the United States, National Summary for Year 2003, Part Five).

3.4 Air Mode

Air cargo through Newark Liberty International Airport (EWR) represents less than 1% of New Jersey tonnage (at less than 1 million tons), but is far more important than its tonnage share would suggest. Air specializes in low-weight, high-value, time-sensitive commodities. Over the past decade, air cargo has been the fastest-growing segment of the national freight market, and is critically important to New Jersey's businesses and consumers in New Jersey. The PANYNJ reports over 964 thousand tons of air cargo loaded and unloaded at EWR; this figure does not include through traffic. TRANSEARCH reports less than 337 thousand tons of air cargo for the entire state of New Jersey. Part of the discrepancy is due to the fact that TRANSEARCH does not capture international air cargo.

Table 10. Comparison of Statewide Air Cargo Tonnage (Short Tons, Newark Liberty Airport Only), 2003

Source	Total	Foreign	Domestic			
		All	Inbound	Outbound	Internal	Through
Port Authority of New York and New Jersey	964,323	185,927		778,396		
TRANSEARCH	336,947	N/A	181,572	155,375	N/A	N/A

Source: Cambridge Systematics analysis of Port Authority of New York and New Jersey "2003 Airport Traffic Report" and TRANSEARCH data.

4.0 Analysis by Commodity

4.1 Overview

In addition to understanding the overall volume of freight moving within New Jersey, it is also important to understand the types of commodities being moved along the state's freight transportation infrastructure.

Different data sources typically use different classification schemes to report tonnage by commodity. The TRANSEARCH database provided commodity information at the four-digit STCC level for truck, water, and air. Rail data obtained from the STB also provided commodity detail that allowed for classification according to the same scheme. Commodities were grouped and analyzed by two-digit commodity groups, shown in Table 11 on the following page. While the commodity flow data reported various flows by as many as 18 commodity groups, for the sake of simplicity only the top ten groups are highlighted in this analysis.

The ACOE waterborne cargo data and PANYNJ air cargo data did not support the same level of commodity-specific analysis. Alternative sources have been used where possible to fill in the data gaps. This allowed for an order-of-magnitude assessment of water and air commodities, but not to the same level of detail as truck and rail commodities. Consequently, it was not possible to select a specific commodity group and determine what share of that commodity group is moving by truck versus rail versus air versus water. Further work to process and refine the air and water data would be needed to develop this information.

Table 11. Major Commodity Groups Used in the New Jersey 2003 Statewide Freight Data Profile

Number	Commodity Group Name	Standard Transportation Commodity Codes Included
1	Agriculture	1 (Farm products) 8 (Forest products) 9 (Fresh fish)
2	Metallic Ores	10 (Metallic ores)
3	Coal	11 (Coal)
4	Petroleum and Nonmetallic Minerals	13 (Crude petroleum, natural gas, gasoline) 14 (Nonmetallic ores or minerals)
5	Food	20 (Food and kindred products)
6	Nondurable Manufactured Goods	21 (Tobacco products) 22 (Textile products) 23 (Apparel) 25 (Furniture or fixtures) 27 (Printed matter)
7	Lumber	24 (Lumber or wood)
8	Paper	26 (Pulp or paper)
9	Chemicals	28 (Chemicals)
10	Products of Petroleum and Coal	29 (Petroleum and coal products)
11	Rubber/Plastic	30 (Rubber or plastic)
12	Durable Manufactured Goods	31 (Leather) 35 (Non-electrical machinery) 36 (Electrical machinery) 38 (Instruments) 39 (Miscellaneous manufactured products)
13	Clay/Concrete/Glass/Stone	32 (Clay, concrete, glass, or stone)
14	Primary Metals	33 (Primary metals)
15	Fabricated Metals	34 (Fabricated metals)
16	Transportation Equipment	37 (Transportation equipment)
17	Miscellaneous Freight	40 (Waste or scrap) 41 (Miscellaneous freight) 42 (Empty containers) 43 (U.S. Postal Service) 44 (Freight forwarder traffic) 45 (Shipper Association traffic) 46 (Mixed freight) 47 (Small packaged freight) 48 (Waste hazardous materials)
18	Warehousing	51 (Traffic from/to warehousing and other secondary distribution facilities) 52 (Drayage traffic from/to intermodal rail yards) 53 (Drayage traffic from/to airports)

4.2 Truck Commodities

Table 12 below shows New Jersey's top truck commodities (for inbound, outbound, and intrastate moves), ranked by truckload equivalents and weight. The rankings show slight differences, due to differences in the tons to truckload conversion factors associated with the various commodity groups.

By a wide margin, the top truck commodity in terms of truckloads is warehousing, which includes a mix of high and low value goods moving to/from warehouses, seaports, and airports. Warehouse goods account for around 30% of all truckload equivalents. Second is petroleum and nonmetallic minerals, which includes crude petroleum, gasoline, natural gas, and various ores and minerals. Third is products of petroleum and coal, which includes kerosene, heating oil, asphalt, etc. Fourth is food and food products. Rounding out the top five is clay/concrete/glass/stone. In terms of tonnage, the same groups comprise the top five, with warehousing again leading by a wide margin.

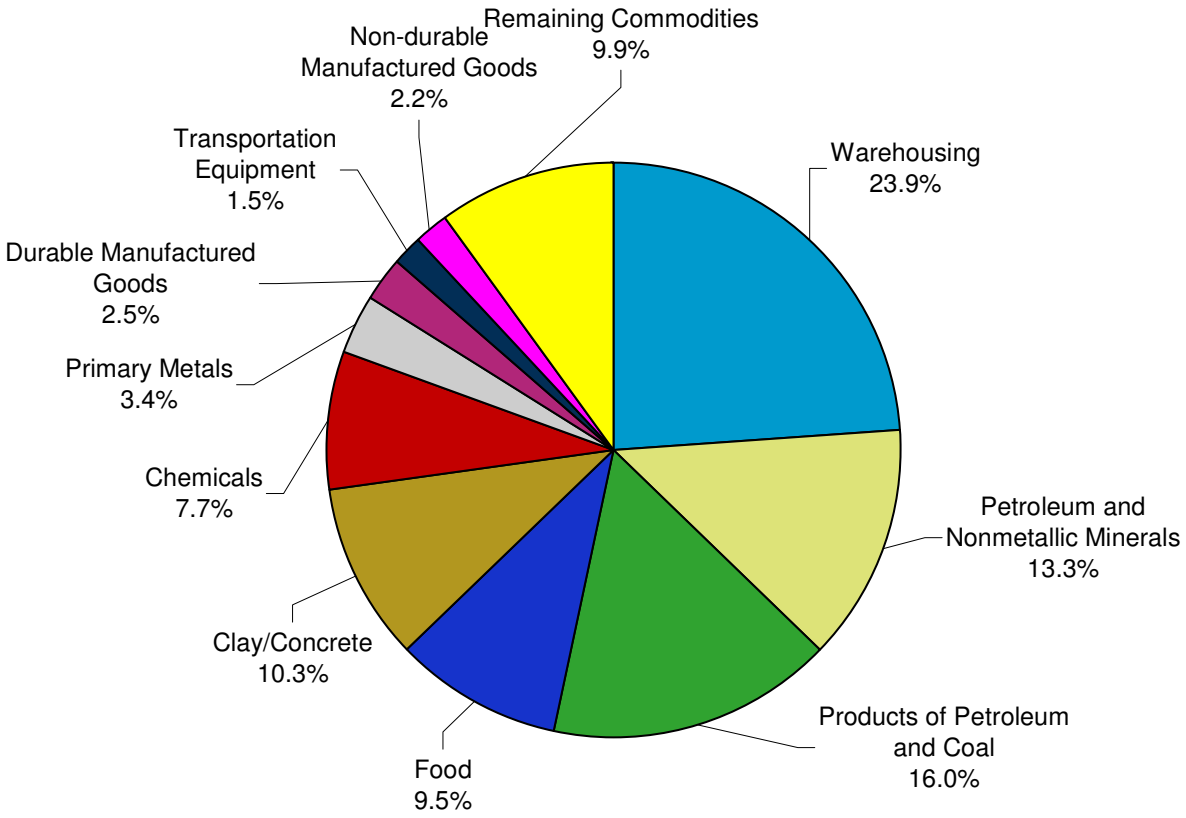
Table 12. Top Truck Commodities (Inbound, Outbound, and Intrastate), 2003

Number	Commodity Group	Truckload Equivalents	Share	Short Tons
18	Warehousing	8,059,534	29%	83,238,369
4	Petroleum and Nonmetallic Minerals	3,843,956	14%	46,187,787
10	Products of Petroleum and Coal	3,427,855	12%	55,840,726
5	Food	2,520,266	9%	32,912,374
13	Clay/Concrete/Glass/Stone	2,444,844	9%	35,708,400
9	Chemicals	1,771,557	6%	26,791,677
14	Primary Metals	894,239	3%	11,854,722
12	Durable Manufactured Goods	728,393	3%	8,579,904
16	Transportation Equipment	717,688	3%	5,097,787
6	Nondurable Manufactured Goods	643,921	2%	7,496,916
	Remaining Commodities	2,454,915	9%	34,556,360
TOTAL		**27,507,166**	**100%**	**348,265,023**

Source: Cambridge Systematics analysis of TRANSEARCH data and FreightTools$_{CS}$.
Note: Columns may not sum precisely to totals due to rounding.

For inbound traffic, the leading commodity group is food, with warehousing a close second; there is a relatively even distribution of tonnage among the commodity groups, with none clearly dominant. For outbound traffic, the leading commodities are warehousing and products of petroleum and coal, which represent a dominant share of truckloads and tonnage. For intrastate traffic, the leading commodities are warehousing and petroleum and nonmetallic minerals, which represent a dominant share of truckloads and tonnage. These patterns highlight the importance of trucking to three of New Jersey's most critical industries – food, warehouse/distribution, and petroleum/petrochemical.

Figure 15. Truck Commodities by Weight (Short Tons), 2003
(Inbound, Outbound, and Intrastate)



Source: Cambridge Systematics analysis of TRANSEARCH data.

Table 13. Top Inbound Truck Commodities, 2003

Number	Commodity Group	Truckload Equivalents	Share	Short Tons
5	Food	1,345,743	19%	19,976,264
18	Warehousing	931,968	13%	12,427,752
13	Clay/Concrete/Glass/Stone	830,584	12%	13,190,563
9	Chemicals	789,433	11%	12,454,229
10	Products of Petroleum and Coal	492,945	7%	9,728,580
1	Agriculture	446,274	6%	4,885,005
7	Lumber	371,968	5%	7,092,805
14	Primary Metals	304,382	4%	4,748,047
4	Petroleum and Nonmetallic Minerals	294,253	4%	4,399,953
16	Transportation Equipment	275,172	4%	2,377,613
	Remaining Commodities	840,489	12%	12,592,672
TOTAL		**6,923,212**	**100%**	**103,873,482**

Source: Cambridge Systematics analysis of TRANSEARCH data and FreightTools$_{CS}$.
Note: Columns may not sum precisely to totals due to rounding.

Table 14. Top Outbound Truck Commodities, 2003

Number	Commodity Group	Truckload Equivalents	Share	Short Tons
18	Warehousing	2,352,284	29%	28,807,759
10	Products of Petroleum and Coal	1,838,412	23%	31,600,660
13	Clay/Concrete/Glass/Stone	906,948	11%	12,641,409
9	Chemicals	721,755	9%	12,482,411
5	Food	576,715	7%	7,922,471
12	Durable Manufactured Goods	332,655	4%	4,151,425
6	Nondurable Manufactured Goods	257,642	3%	3,656,947
14	Primary Metals	239,161	3%	4,341,956
8	Paper	217,895	3%	2,915,523
16	Transportation Equipment	184,945	2%	1,513,985
	Remaining Commodities	427,334	5%	7,549,705
TOTAL		**8,055,746**	**100%**	**117,584,251**

Source: Cambridge Systematics analysis of TRANSEARCH data and FreightTools$_{CS}$.
Note: Columns may not sum precisely to totals due to rounding.

Table 15. Top Intrastate Truck Commodities, 2003

Number	Commodity Group	Truckload Equivalents	Share	Short Tons
18	Warehousing	4,775,281	38%	42,002,858
4	Petroleum and Nonmetallic Minerals	3,543,820	28%	41,709,424
10	Products of Petroleum and Coal	1,096,499	9%	14,511,486
13	Clay/Concrete/Glass/Stone	707,312	6%	9,876,428
5	Food	597,809	5%	5,013,639
14	Primary Metals	350,695	3%	2,764,720
9	Chemicals	260,369	2%	1,855,037
16	Transportation Equipment	257,570	2%	1,206,189
6	Nondurable Manufactured Goods	254,521	2%	1,979,890
8	Paper	188,527	2%	1,699,994
	Remaining Commodities	495,805	4%	4,187,625
TOTAL		**12,528,208**	**100%**	**126,807,290**

Source: Cambridge Systematics analysis of TRANSEARCH data and FreightToolsCS.
Note: Columns may not sum precisely to totals due to rounding.

4.3 Rail Commodities

Table 16 on the following page shows New Jersey's top rail commodities (for inbound, outbound, and intrastate moves) ranked by tonnage. By a wide margin, the top rail commodity is "miscellaneous freight." This includes a mix of goods typically shipped in containers. These container moves reflect three basic submarkets: international containers that arrive at west coast seaports and move by rail to Northern New Jersey (in an operation known as "mini-landbridge") and then are returned west; international containers that arrive at the Port of New York and New Jersey and are moved inland via rail, and vice-versa; and other container moves between New Jersey and North American origins and destinations. Intermodal accounts for 34% of inbound rail tonnage and 54% of outbound rail tonnage. Aside from miscellaneous freight, the leading rail commodities are: chemicals; food; transportation equipment (autos and trucks moving in specialized railcars); paper; lumber; products of coal and petroleum; coal; and petroleum and nonmetallic minerals.

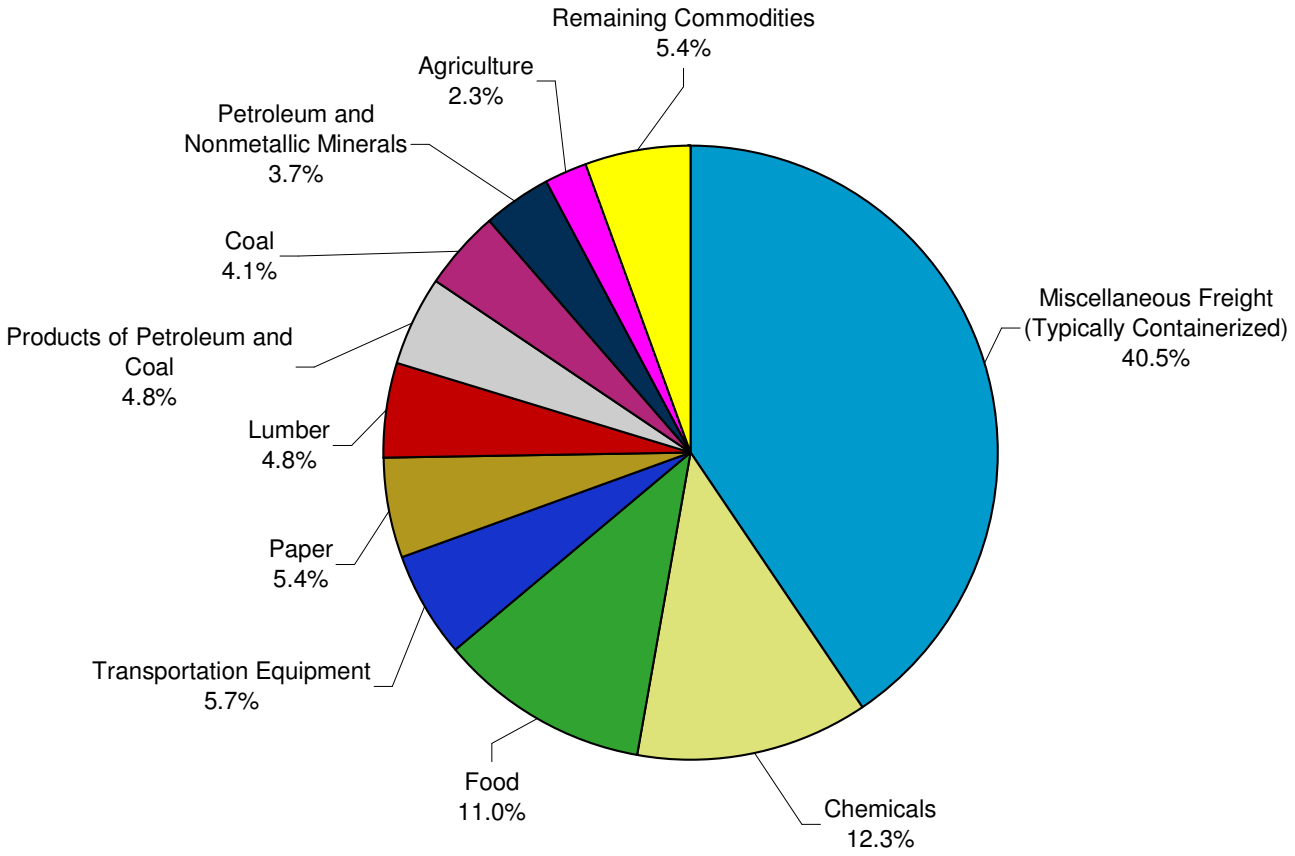
Table 16. Top Rail Commodities (Inbound, Outbound, and Intrastate), 2003

Number	Commodity Group	Short Tons	Share
17	Miscellaneous Freight	13,685,508	41%
9	Chemicals	4,143,872	12%
5	Food	3,720,728	11%
16	Transportation Equipment	1,916,488	6%
8	Paper	1,813,620	5%
7	Lumber	1,621,420	5%
10	Products of Coal and Petroleum	1,616,092	5%
3	Coal	1,400,487	4%
4	Petroleum and Nonmetallic Minerals	1,261,706	4%
1	Agriculture	773,415	2%
	Remaining Commodities	1,834,832	5%
TOTAL		**33,788,168**	**100%**

Source: Cambridge Systematics analysis of Federal Railroad Administration data.

For inbound traffic, the dominant commodity group is miscellaneous freight, followed by food and chemicals. For outbound traffic, the dominant commodity group is miscellaneous freight, followed by chemicals. For intrastate traffic – which represents a very small share of total rail traffic – the leading commodities are chemicals and products of petroleum and coal. There is almost no intrastate movement of containers by rail. These patterns highlight the importance of rail as part of the logistics chain for intermodal containers, and as a critical mode in handling higher-weight bulk commodities; they also highlight its current function as being longer-haul services, as opposed to intrastate or shorter-distance services.

Figure 16. Rail Commodities by Weight (Short Tons), 2003
(Inbound, Outbound, and Intrastate)



Source: Cambridge Systematics analysis of Federal Railroad Administration data.

Table 17. Top Inbound Rail Commodities, 2003

Number	Commodity Group	Short Tons	Share
17	Miscellaneous Freight	6,502,784	29%
5	Food	3,498,108	16%
9	Chemicals	2,918,472	13%
16	Transportation Equipment	1,691,652	8%
8	Paper	1,645,840	7%
7	Lumber	1,539,260	7%
3	Coal	1,300,533	6%
4	Petroleum and Nonmetallic Minerals	883,936	4%
10	Products of Petroleum and Coal	706,212	3%
1	Agriculture	556,128	2%
	Remaining Commodities	1,276,020	6%
TOTAL		**22,518,945**	**100%**

Source: Cambridge Systematics analysis of Federal Railroad Administration data.

Table 18. Top Outbound Rail Commodities, 2003

Number	Commodity Group	Short Tons	Share
17	Miscellaneous Freight	7,180,284	65%
9	Chemicals	1,063,720	10%
10	Products of Petroleum and Coal	827,564	8%
4	Other Minerals	369,810	3%
14	Primary Metals	365,812	3%
16	Transportation Equipment	222,196	2%
1	Agriculture	217,287	2%
5	Food	192,360	2%
8	Paper	164,820	2%
3	Coal	99,954	1%
	Remaining Commodities	270,560	2%
TOTAL		**10,974,367**	**100%**

Source: Cambridge Systematics analysis of Federal Railroad Administration data.

Table 19. Top Intrastate Rail Commodities, 2003

Number	Commodity Group	Short Tons	Share
9	Chemicals	161,680	55%
10	Products of Petroleum and Coal	82,316	28%
5	Food	30,260	10%
4	Other Minerals	7,960	3%
14	Primary Metals	3,720	1%
8	Paper	2,960	1%
16	Transportation Equipment	2,640	1%
17	Miscellaneous Freight	2,440	1%
7	Lumber	880	0%
TOTAL		**294,856**	**100%**

Source: Cambridge Systematics analysis of Federal Railroad Administration data.

4.4 Water Commodities

As discussed previously in Section 3.3, the TRANSEARCH data appears to be very consistent with the ACOE data with regard to the amount of domestic tonnage handled by New Jersey's ports.

TRANSEARCH does provides a breakdown of this domestic waterborne tonnage by commodity type, as shown in Table 20 on the following page. The leading commodity class is products of petroleum and coal, most of which is moving outbound from New Jersey ports to other marine terminals in New York City and along the East Coast. Miscellaneous freight shipments account for the second largest total, followed by chemicals and petroleum and nonmetallic minerals.

Table 20. Domestic Waterborne Commodities (Inbound, Outbound and Intrastate) by Weight (Short Tons), 2003

	Commodity Group	Total	Inbound	Outbound	Intrastate
10	Products of Petroleum and Coal	38,270,081	8,848,508	25,524,533	3,897,041
17	Miscellaneous Freight	8,215,045	5,479,520	2,304,396	431,129
9	Chemicals	2,225,958	1,710,148	310,524	205,286
4	Petroleum/Nonmetallic Minerals	436,759	436,759	0	0
TOTAL		**49,147,843**	**16,474,935**	**28,139,453**	**4,533,456**

Source: Cambridge Systematics analysis of U.S. Army Corps of Engineers data.

The ACOE data on international waterborne freight does not allow for a directly comparable breakdown of tonnage by commodity, because the ACOE data is aggregated differently. New Jersey hosts many different active marine cargo terminals, both public and private. Some (like the Port of New York and New Jersey) are counted as part of the New York District; others (like the ports of Camden, Gloucester, and Paulsboro) are counted as part of the Philadelphia District.

A facility-level inventory would be needed to conclusively determine what international commodities and volumes are moving through New Jersey's marine terminals. The data used in this study support only the following findings:

- The ACOE estimates New Jersey's international waterborne tonnage at around 61.7 million tons – 53.5 million tons import and 8.2 million tons export.

- A recent study for the North Jersey Transportation Planning Authority estimated New Jersey's share of PONYNJ container and automobile traffic at 18.5 million tons – 12.8 million tons import and 5.7 million tons export. Containers handle a wide variety of manufactured products and materials.

The amount of New Jersey international waterborne tonnage that cannot be assigned to a specific commodity class is therefore around 43.2 million tons. The commodities associated with this tonnage may – or may not – be distributed in a manner similar to the district-wide totals, as shown in Table 21 below. Imports through both port districts are clearly dominated, in terms of tonnage, by the import of petroleum and petroleum products. Please note that Table 21 includes all facilities located within these port districts, including facilities in New York, Pennsylvania, and Delaware.

Table 21. International Waterborne Tonnage (Short Tons) by Port Districts, 2003

Port District	Commodity	Total Tons (000)	Inbound Tons (000)	Outbound Tons (000)
Philadelphia	Coal	522	521	1
	Petroleum and Petroleum Products	65,801	65,600	201
	Chemicals	1,659	1,358	301
	Crude Materials	2,781	2,301	471
	Primary Manufactured Goods	4,335	3,601	734
	Food and Farm Products	2,760	2,732	28
	Manufactured Products	431	313	118
	Unknown/Other	179	159	20
	Total	**78,468**	**76,594**	**1,874**
New York	Coal	743	741	2
	Petroleum and Petroleum Products	43,955	43,226	729
	Chemicals	4,362	3,042	1,320
	Crude Materials	8,456	5,222	3,234
	Primary Manufactured Goods	5,656	4,424	1,232
	Food and Farm Products	7,193	6,210	983
	Manufactured Products	7,872	6,381	1,491
	Unknown/Other	1,447	1,005	442
	Total	**79,684**	**70,251**	**9,433**

Source: Cambridge Systematics analysis of U.S. Army Corps of Engineers data.

4.5 Air Commodities

As discussed previously in Section 3.4, the PANYNJ reports over 964 thousand tons of air cargo for EWR. The only commodity-level information available for this 964 thousand tons is from the PANYNJ, which distinguishes between revenue freight and revenue mail.

Table 22. Air Cargo Commodities (Inbound, Outbound, and Intrastate) by Weight (Short Tons, Newark Liberty Airport Only), 2003

Cargo Type	Total Tons	Domestic Tons	International Tons
Revenue Freight	890,712	712,458	178,254
Revenue Mail	73,611	65,938	7,673
TOTAL	**964,323**	**778,396**	**185,927**

Source: Cambridge Systematics analysis of Port Authority of New York and New Jersey data.

Additional commodity-level detail is provided by TRANSEARCH; however, this information only covers the 337 thousand tons of air cargo included in the dataset. Around half of the tonnage is associated with miscellaneous freight (which includes mail and express).

Table 23. Domestic Air Cargo Commodities by Weight (Short Tons) as Reported by TRANSEARCH, 2003

Name	Commodity Group	Total	Inbound	Outbound	Intrastate
17	Miscellaneous Freight	161,328	90,534	70,793	0
12	Durable Manufactured Goods	66,715	38,899	27,816	0
9	Chemicals	43,835	15,474	28,360	0
6	Nondurable Manufactured Goods	23,356	13,573	9,783	0
16	Transportation Equipment	18,768	8,929	9,840	0
15	Fabricated Metals	6,415	2,862	3,553	0
1	Agriculture	4,749	3,709	1,040	0
8	Paper	4,694	2,456	2,206	31
11	Rubber/Plastic	3,702	2,911	791	0
5	Food	2,377	1,453	924	0
10	Products of Petroleum and Coal	464	195	269	0
13	Clay/Concrete/Glass/Stone	390	390	0	0
14	Primary Metals	147	147	0	0
7	Lumber	39	39	0	0
TOTAL		**336,978**	**181,571**	**155,375**	**31**

Source: Cambridge Systematics analysis of TRANSEARCH data.

5.0 Analysis by Trading Partner

5.1 Overview

In addition to the commodity flow data reported above, it is also important to identify New Jersey's key trading partners by weight and by value. Trading partners include top origins for flows into New Jersey, as well as top destinations for flows outside of the state. For this report, trading partners for truck and rail moves could be reliably identified.

Table 24 shows the top trading partners for external freight movements into and out of New Jersey in 2003 by weight (truck and rail modes only), while Table 25 shows the ranking by value (truck and rail modes only). Figures 17 and 18 show the top trading partners by weight and value, respectively. The top ten trading partners accounted for 46 percent of inbound and outbound flows by weight, or 117 million tons, and about 33 percent of flows by value, or $183 billion. Illinois ranked as the top trading partner in total weight and value, with two-thirds of its overall tonnage and value attributed to inbound movements into New Jersey.

In terms of total weight (inbound and outbound tonnage), top trading partners also included New York West (14.5 million), New York East (13.8 million), and Pennsylvania South (13.2 million). When only considering inbound tonnage coming into New Jersey, a rather different pattern emerges among the key trading partners. While Illinois still retains its place as the top trading partner (13 million), it is followed by Louisiana (10.5 million) and California (5.6 million). In contrast, the largest outbound tonnage flows from New Jersey were destined for New York East (12.4 million), New York West (11.7 million), and Illinois (6.4 million).

The top trading partners by total value (inbound and outbound value) are Illinois ($24.2 billion), Ohio ($19.5 billion), Virginia ($19.1 billion), and Texas ($18.3 billion). In terms of inbound value only, the top trading partners included Illinois ($16 billion), Louisiana ($13.5 billion), Virginia ($11.7 billion), and Texas ($11.5 billion). In contrast, the largest outbound value flows from New Jersey were destined for New York West ($10.3 billion), Ohio ($8.7 billion), Pennsylvania North ($8.4 billion), and Illinois ($8.3 billion).

The figures on the following pages provide additional illustrative detail on these key trading state relationships.

Figure 17. Trading Partners by Weight (Short Tons) (Truck and Rail Only), 2003

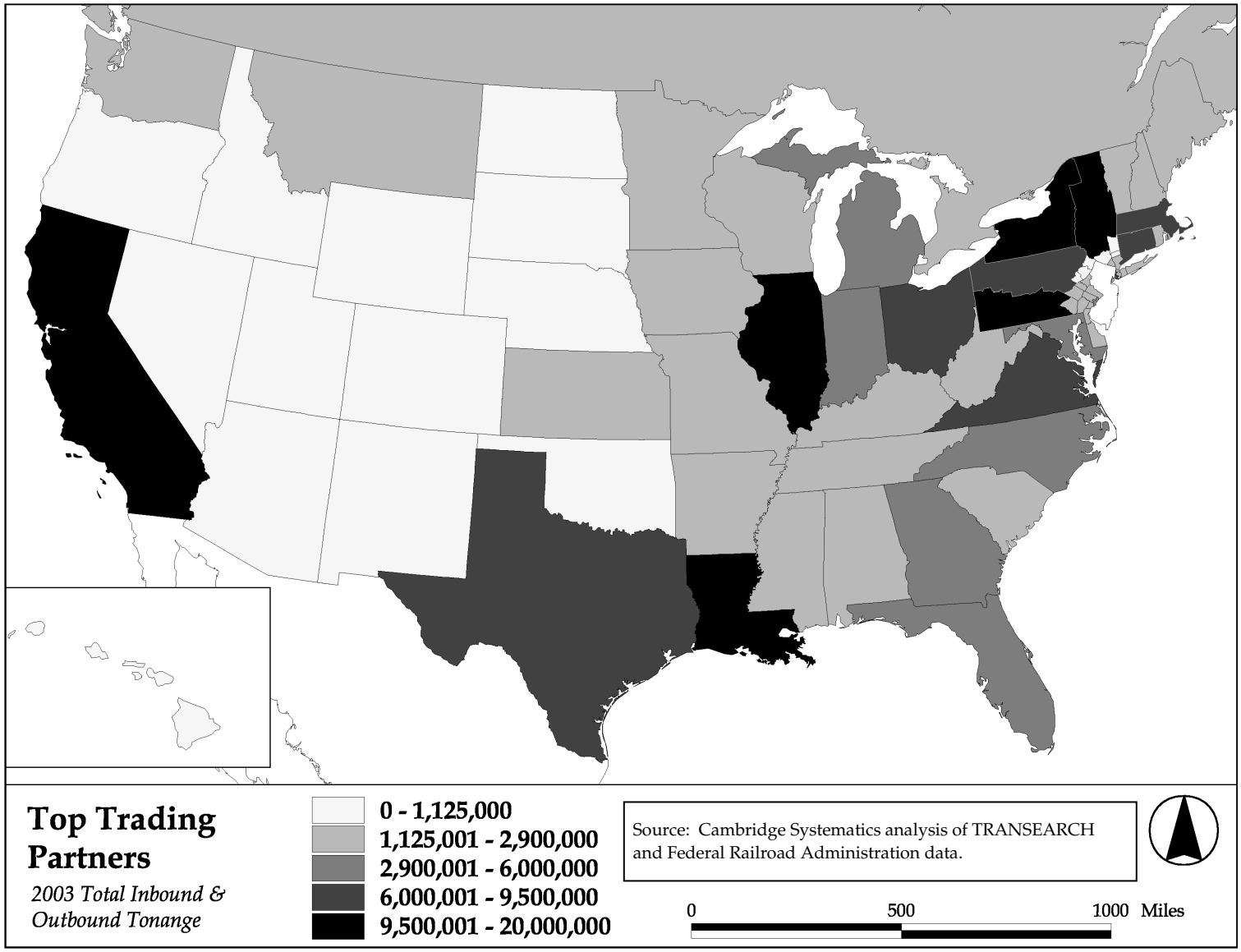


Figure 18. Trading Partners by Value (Truck and Rail Only), 2003

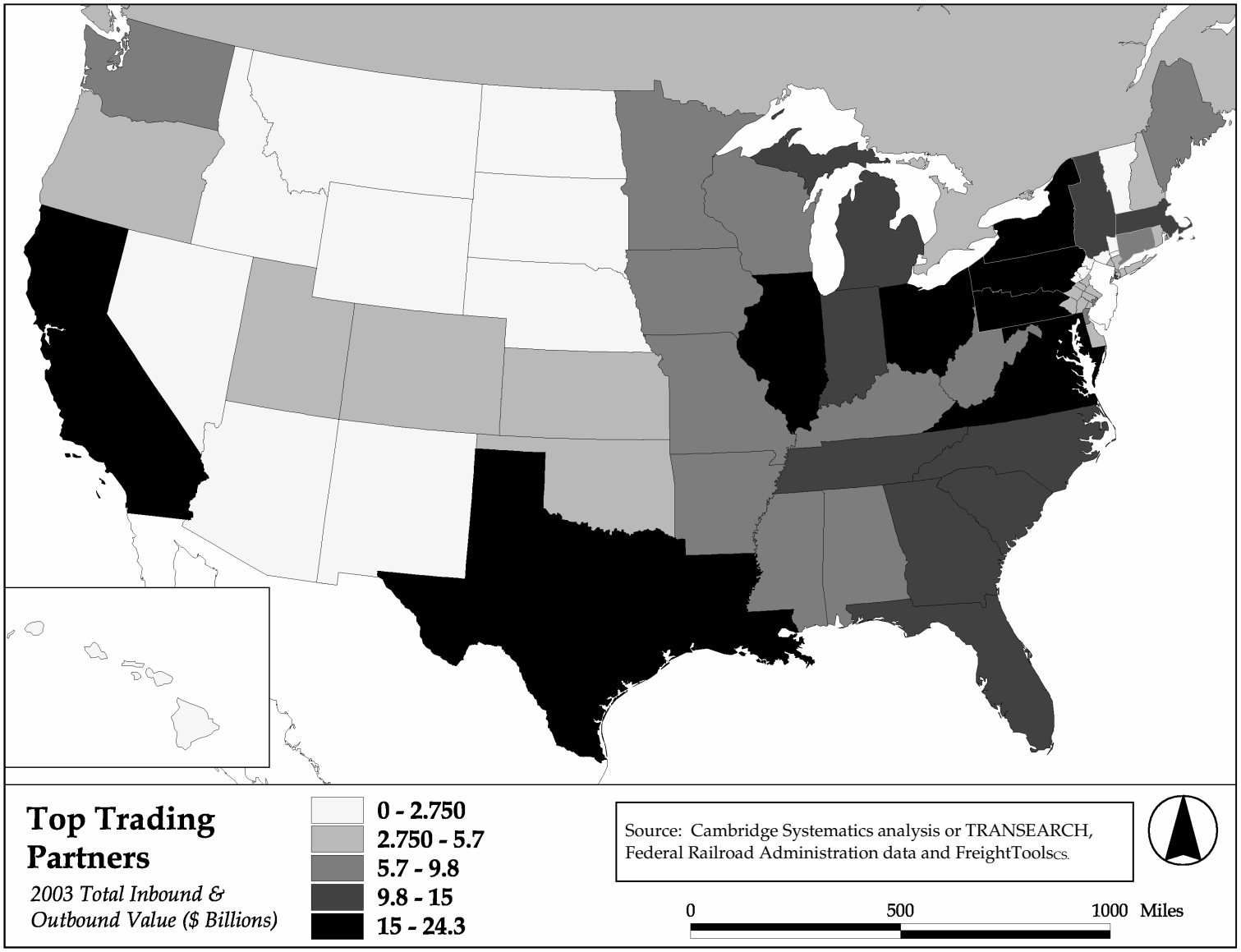


Table 24. Top Trading Partners by Weight (Short Tons, Truck and Rail Only), 2003

Trading Partner	Total Tonnage	Inbound Tonnage/ Percent of Total		Outbound Tonnage/ Percent of Total	
Illinois	19,382,361	12,974,283	67%	6,408,079	33%
New York West	14,548,320	2,853,873	20%	11,694,447	80%
New York East	13,779,590	1,331,459	10%	12,448,131	90%
Pennsylvania South	13,235,487	8,679,637	66%	4,555,851	34%
Louisiana	11,647,012	10,461,119	90%	1,185,893	10%
California	9,528,822	5,628,046	59%	3,900,776	41%
Pennsylvania North	8,875,991	3,565,761	40%	5,310,230	60%
Virginia	8,864,126	4,450,953	50%	4,413,174	50%
Kings County, New York	8,603,155	2,944,770	34%	5,658,385	66%
Ohio	8,551,710	4,487,532	52%	4,064,178	48%

Source: Cambridge Systematics analysis of TRANSEARCH and Federal Railroad Administration data.

Table 25. Top Trading Partners by Value (Truck and Rail Only), 2003

Trading Partner	Total Value (in Billions)	Inbound Value/ Percent of Total		Outbound Value/ Percent of Total, 2003	
Illinois	$24.2	$16.0	66%	$8.3	34%
Ohio	19.5	10.8	55%	8.7	45%
Virginia	19.1	11.7	61%	7.4	39%
Texas	18.3	11.5	63%	6.8	37%
Louisiana	18.2	13.5	74%	4.7	26%
California	17.9	11.3	63%	6.6	37%
Pennsylvania South	17.5	10.5	60%	7.1	40%
New York West	17.3	7.0	40%	10.3	60%
Pennsylvania North	16.0	7.6	47%	8.4	53%
Maryland	15.2	8.9	59%	6.2	41%

Source: Cambridge Systematics analysis of TRANSEARCH and Federal Railroad Administration data and FreightTools$_{CS}$.

5.2 Truck Trading Partners

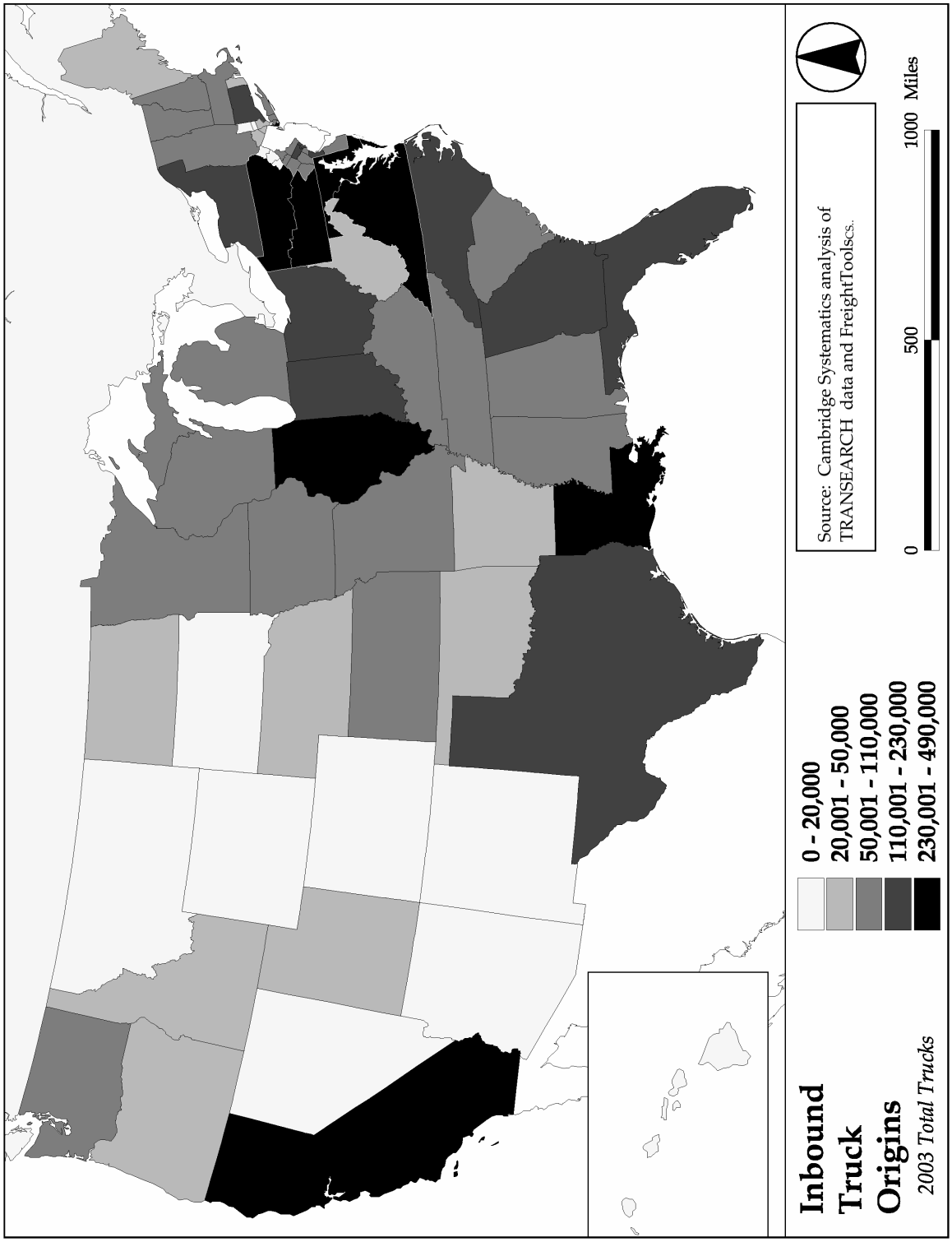


Figure 19. Inbound Truck Origins by Truckload Equivalents, 2003

Figure 20. Outbound Truck Destinations by Truckload Equivalents, 2003

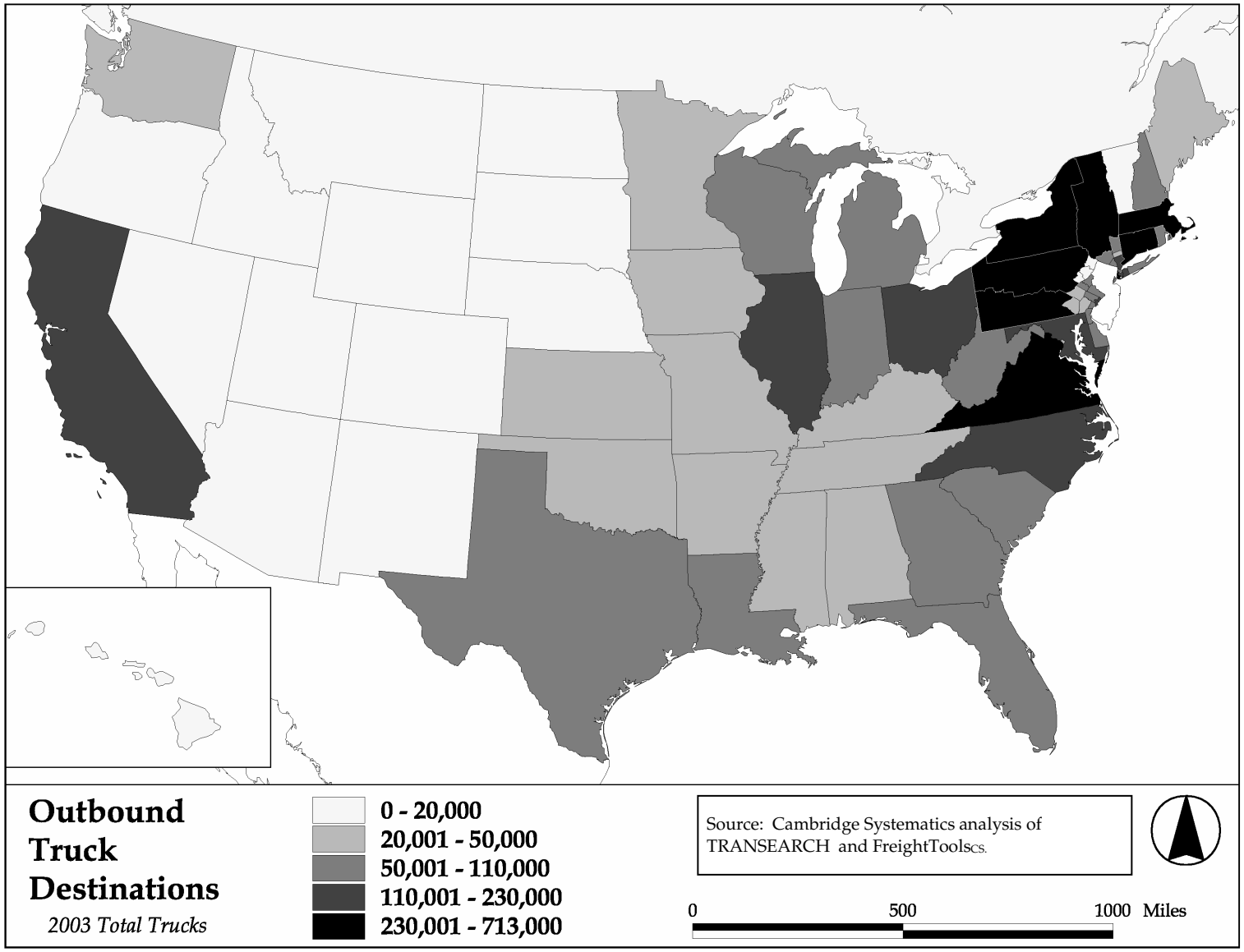


Figure 21. Inbound Truck Origins by Tonnage (Short Tons), 2003

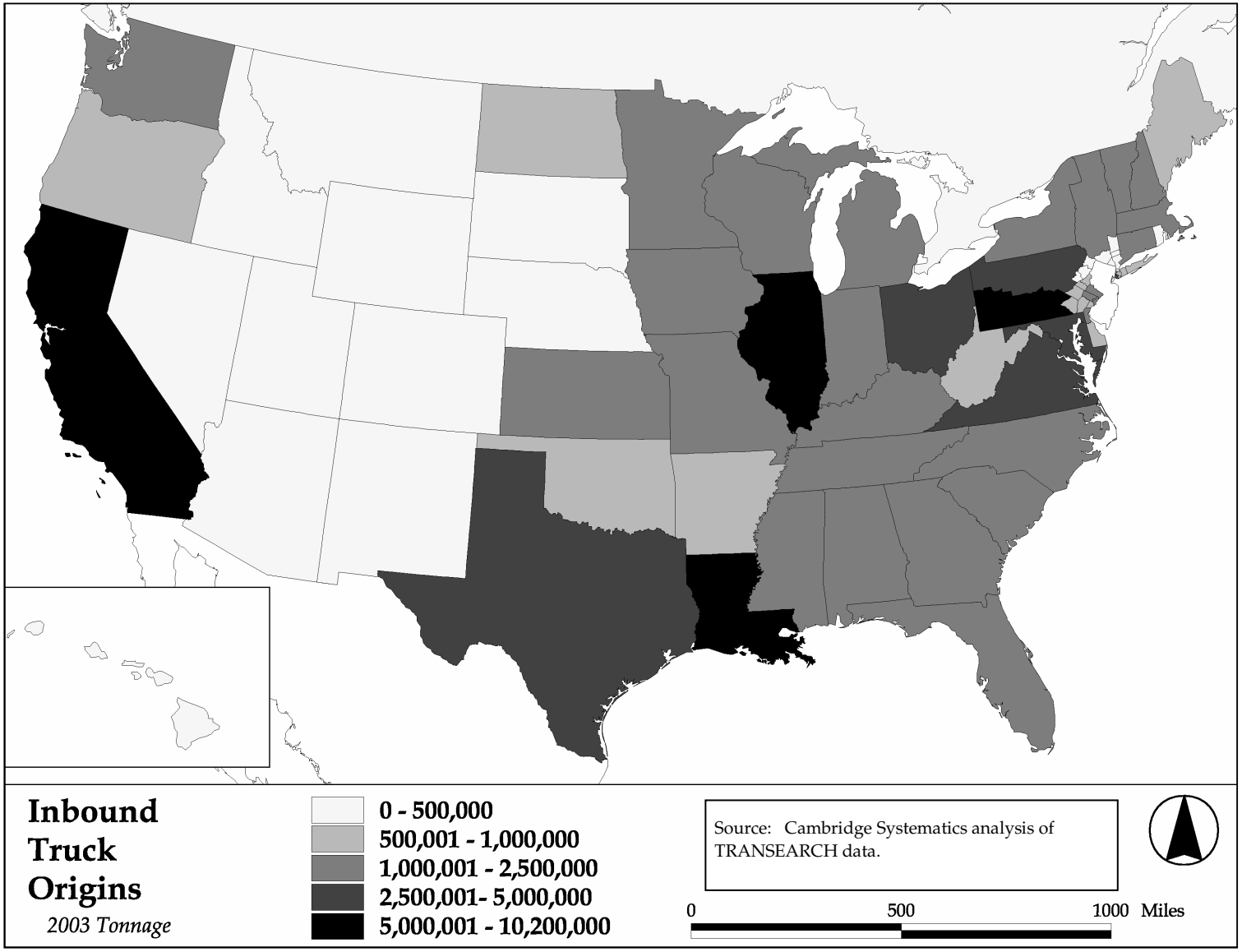


Figure 22. Outbound Truck Destinations by Tonnage (Short Tons), 2003

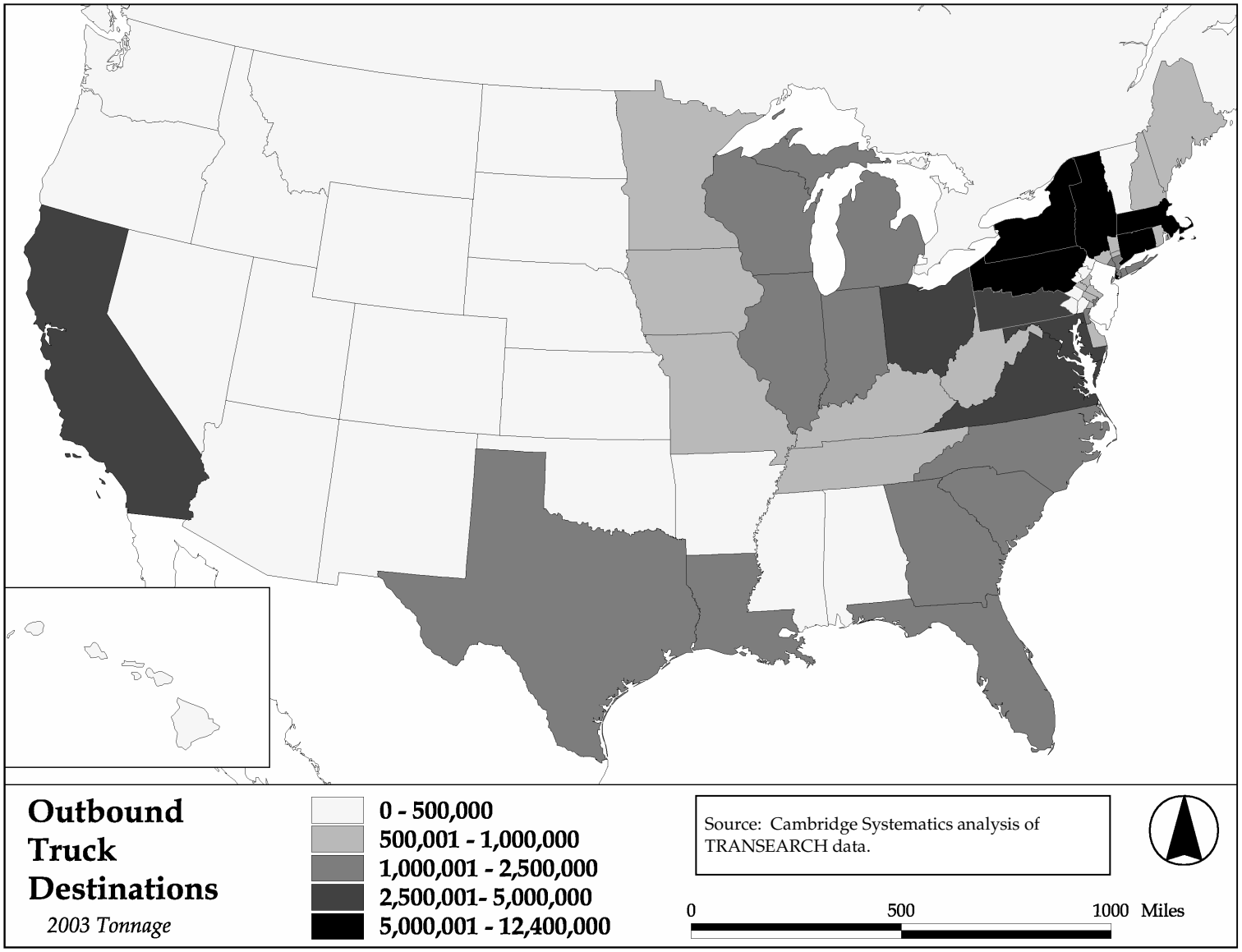


Figure 23. Inbound Truck Origins by Value, 2003

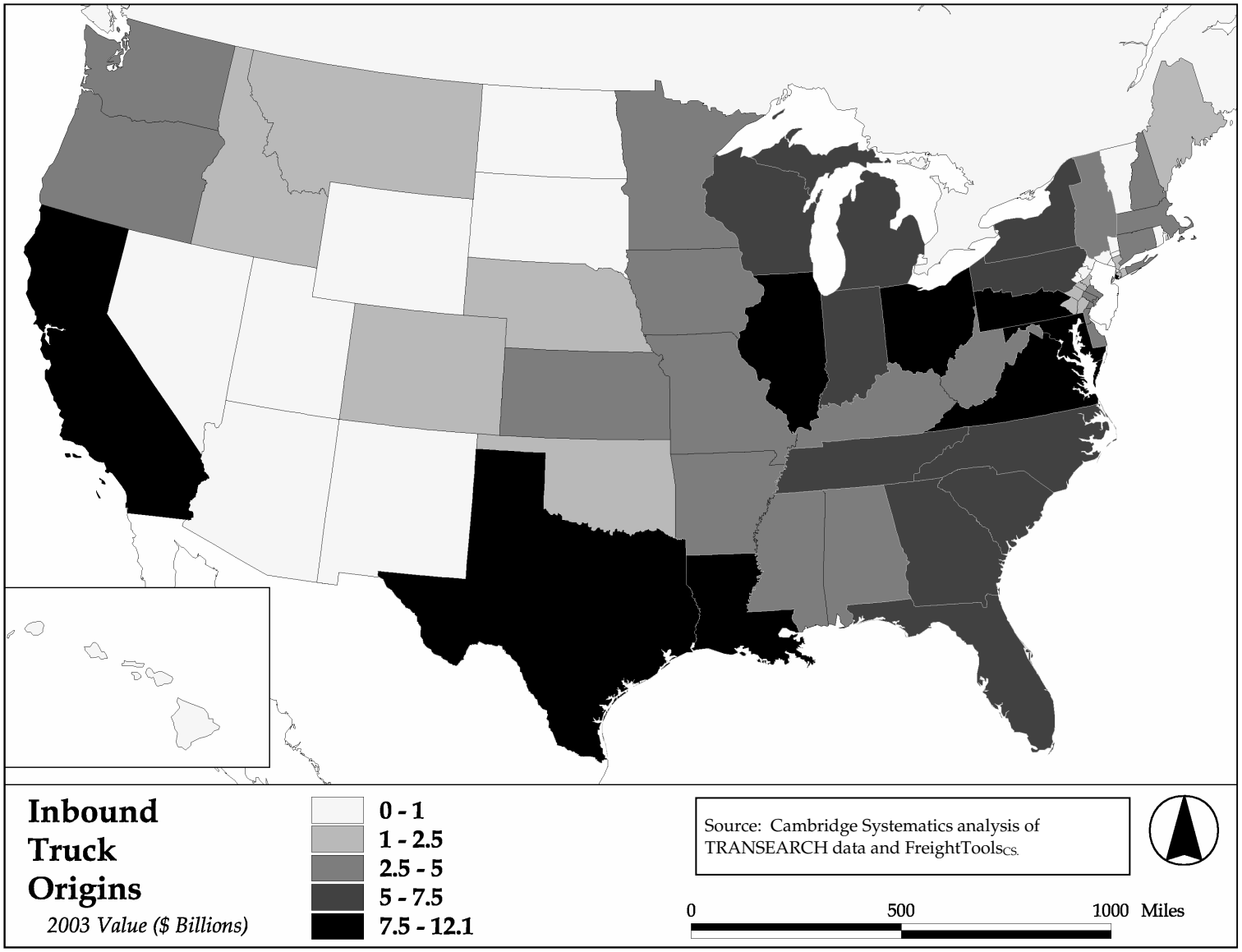
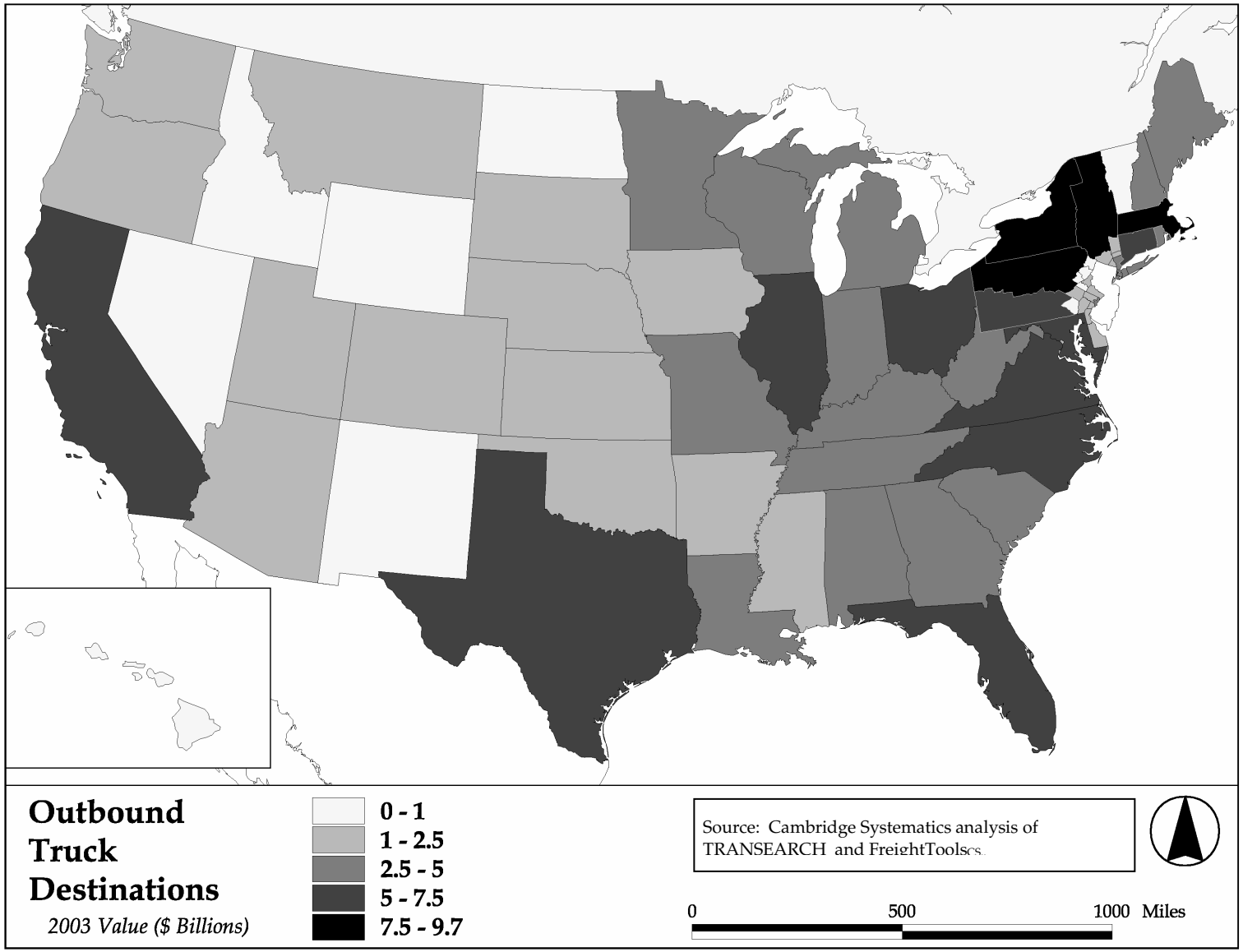


Figure 24. Outbound Truck Destinations by Value, 2003



5.3 Rail Trading Partners

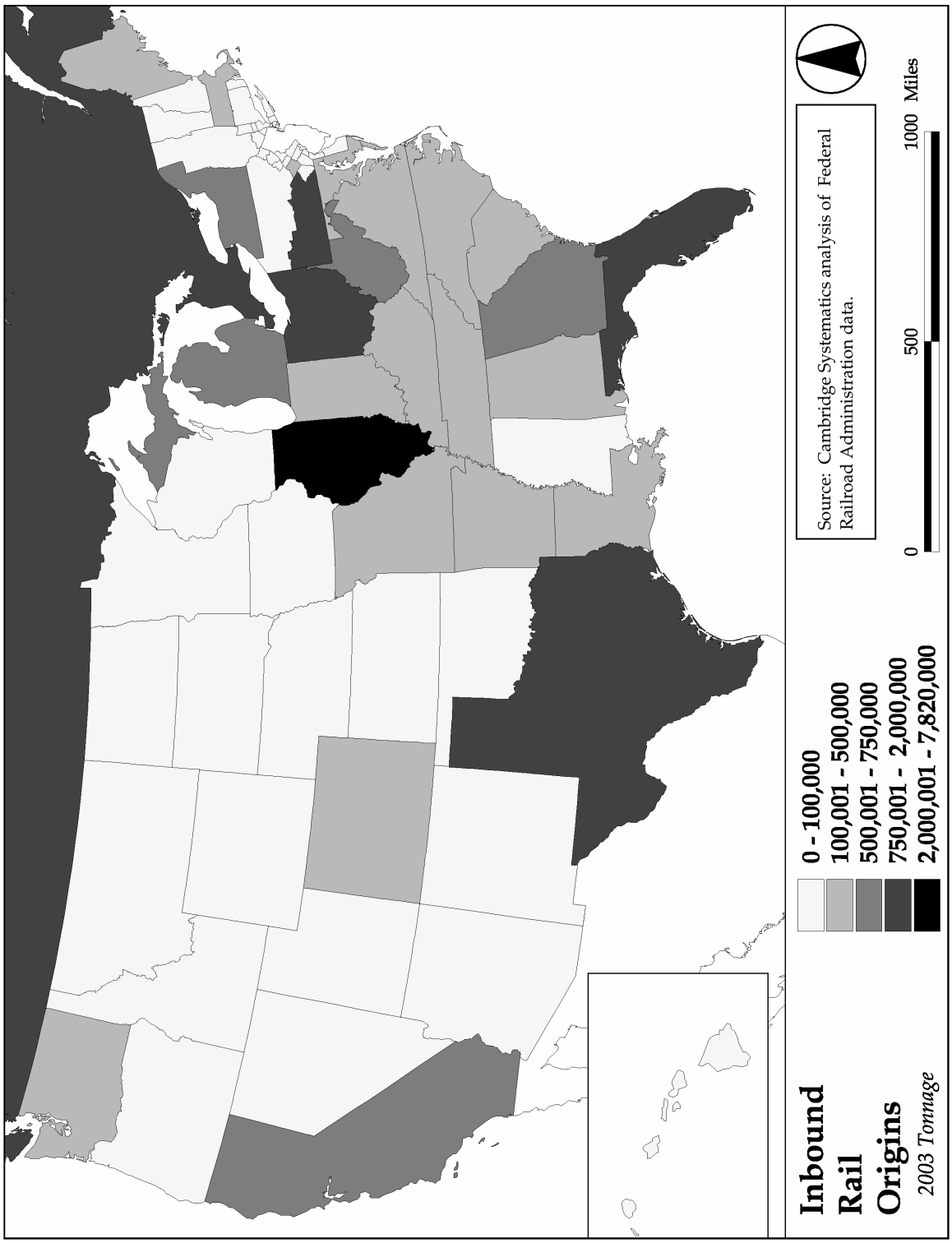


Figure 25. Inbound Rail Origins by Tonnage (Short Tons), 2003

Figure 26. Outbound Rail Destinations by Tonnage (Short Tons), 2003

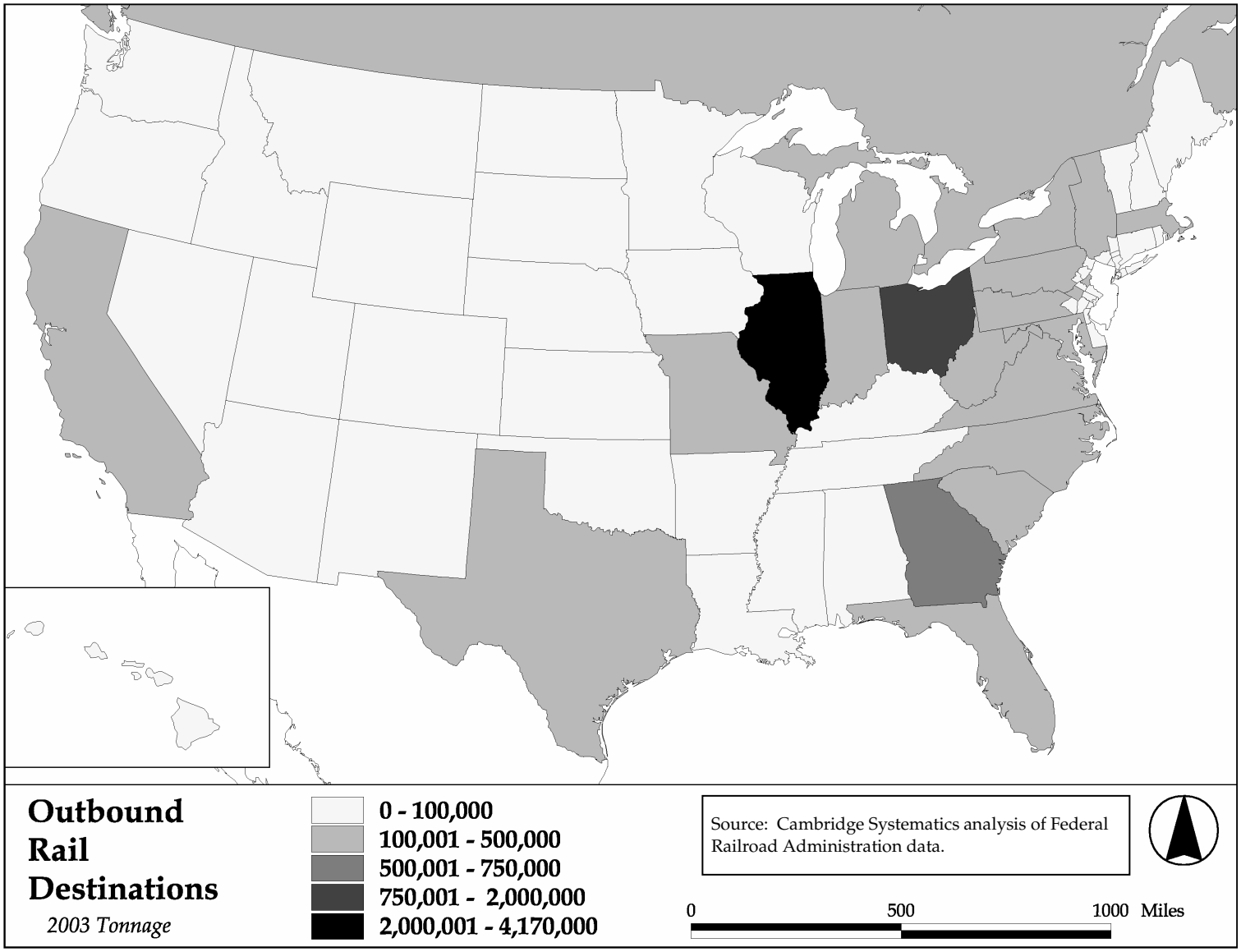


Figure 27. Inbound Rail Origins by Value, 2003

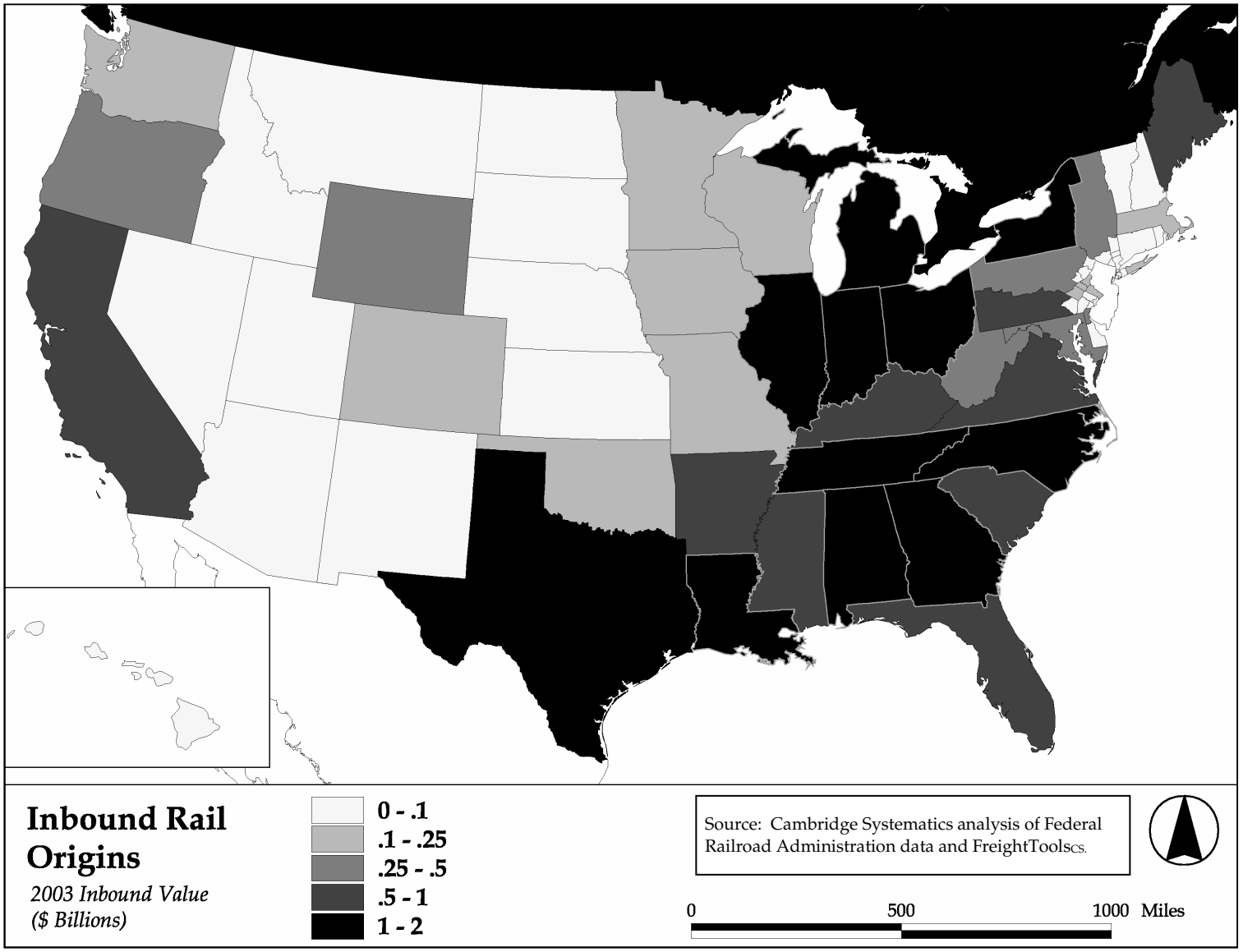
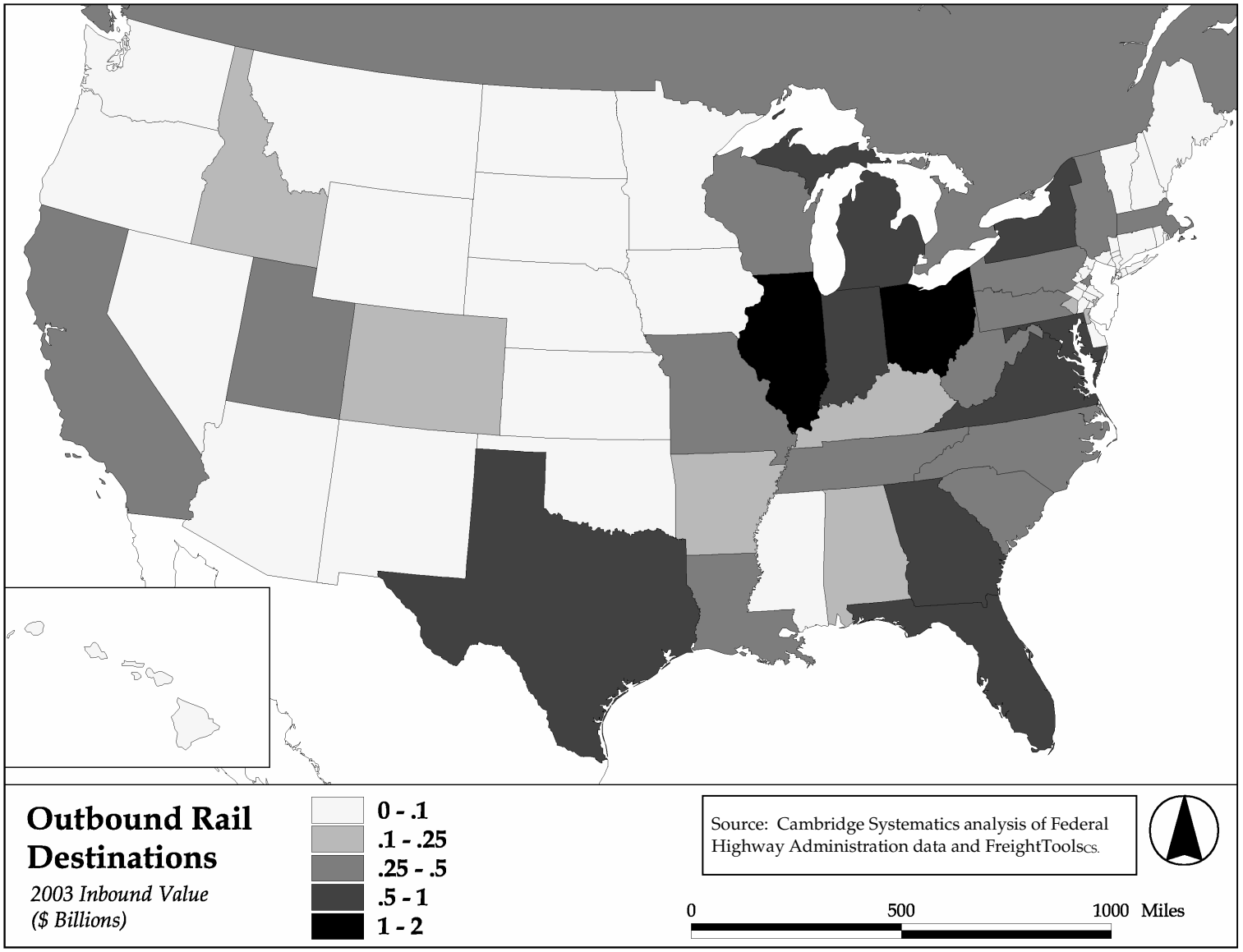


Figure 28. Outbound Rail Destinations by Value, 2003



6.0 Conclusion

Freight data analysis is not a simple procedure. There are multiple modes and multiple sources of data to contend with. The analysis involves considerable effort, and the results can seem abstract. So: what does this all mean for New Jersey?

- The state handles a huge amount of freight – over 620 million tons in year 2003.

- Freight is moving in different directions, for different purposes – around 32% inbound, around 27% outbound, around 21% intrastate, and around 20% through. The inbound and outbound tonnage supports economic activity between New Jersey and other national and international markets. The intrastate tonnage supports New Jersey's internal economic activity. The through tonnage takes up space on New Jersey's scarce transportation infrastructure.

- All modes of transportation are important. On a tonnage basis, around 75% is handled by truck; around 18% is handled by water; and around 7% is handled by rail. Even though less than 1% is handled by air, it is significant because of the specialized service it provides to high-value, time-sensitive commodities.

- A huge variety of commodities – from high-value freight carried by air and in shipping containers, to lower-value petroleum and similar bulk commodities – are critical to the production, consumption, and intermediate processing of goods in New Jersey.

- Every county in New Jersey is impacted by freight movement. The effects differ with respect to mode (truck, rail, water, or air), type (inbound, outbound, or through), and intensity (high, moderate, or low impact) – but it is a significant issue for all counties.

Understanding the nature and magnitude of the freight movements that must be accommodated over New Jersey's transportation infrastructure is the first step in developing coordinated, lasting plans and programs to ensure that the state's current and future freight needs are appropriately addressed.

Appendix A

About NJDOT's TRANSEARCH Data Purchase

About NJDOT's TRANSEARCH Data Purchase

NJDOT's TRANSEARCH data purchase was based on the following specifications.

Geographic Coverage

All flows of domestic U.S. and Canada and Mexico cross-border freight that originate, terminate, or pass through the state of New Jersey.

Geographic Market Detail

Origin and destination markets defined at the county-level for all of New Jersey, plus the following out-of-state counties:

- New Castle, Delaware;
- Bronx, New York;
- Dutchess, New York;
- Kings, New York;
- Nassau, New York;
- New York, New York;
- Orange, New York;
- Putnam, New York;
- Queens, New York;
- Richmond, New York;
- Rockland, New York;
- Suffolk, New York;
- Westchester, New York;
- Berks, Pennsylvania;
- Bucks, Pennsylvania;
- Carbon, Pennsylvania;
- Chester, Pennsylvania;
- Delaware, Pennsylvania;
- Lancaster, Pennsylvania;
- Lehigh, Pennsylvania;
- Monroe, Pennsylvania;
- Montgomery, Pennsylvania;
- Northampton, Pennsylvania;
- Philadelphia, Pennsylvania; and
- Pike, Pennsylvania.

Out-of-state U.S. markets are defined by state (with the above counties netted from Delaware, New York and Pennsylvania), and New York State is split into an East and West region, while Pennsylvania is split into North and South regions.

Figure A.1. TRANSEARCH Analysis Regions